the OIL AND GAS JOURNAL

FRANKS RIGS BEST FOR EXPLORATORY WORK

Franks Model SA4500 on location

APRIL 1949

"SENDING OUR FRANKS RIG TO CANADA . . . . .

Lower cost, due to portability and quick rig-up, makes it highly desirable in that highly competitive area."

NOVEMBER 1949

"IT'S DRILLING 5 WELLS TO 4 WELLS FOR OTHER RIGS . . .

The versatility of operations of our Franks rig is giving us an advantage over other type rigs."

The above is quoted from letters in our files from a major drilling contractor. They may be seen upon request. Franks truck, trailer and skid mounted rigs offer the greatest versatility for exploratory and production drilling and Franks sales engineers are available to discuss with you how they can meet your needs and save you money.

FRANKS MFG. CORP.
BOX 3218 TULSA, OKLA.

Star Features

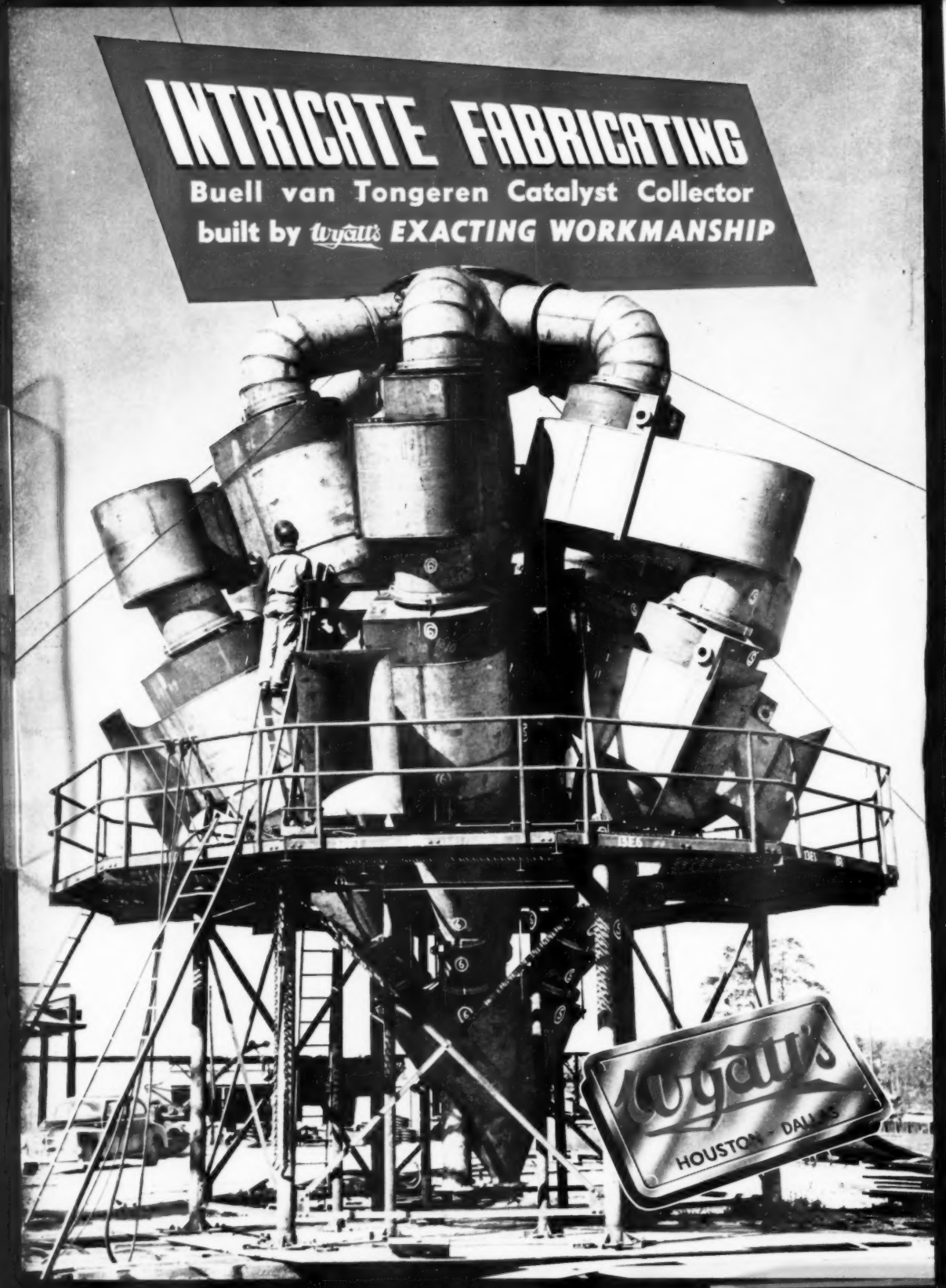
- ★ Franksair "Feather-in" Air Controls
- ★ Improved Final Drive Friction Drum Clutch
- ★ Larger Hydraulically Equalized Brakes
- ★ Fastest rig-up and rig-down
- ★ Factory service and spare parts at strategic points

FRANKS MFG. CORP.
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

PRICE 50 CENTS

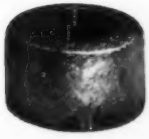
TABLE OF CONTENTS PAGE 33

DECEMBER 1, 1949


INTRICATE FABRICATING
Buell van Tongeren Catalyst Collector
built by Wyatt's EXACTING WORKMANSHIP
Wyatt's
HOUSTON - DALLAS

Toothed Lock Washer: Prevents loss of stem nut due to vibration, thereby holding the handwheel securely.

Newly Designed Handwheel: Air-cooled, finger grip handwheel affords sure grip even with greasy gloves.



Improved Packing: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure.

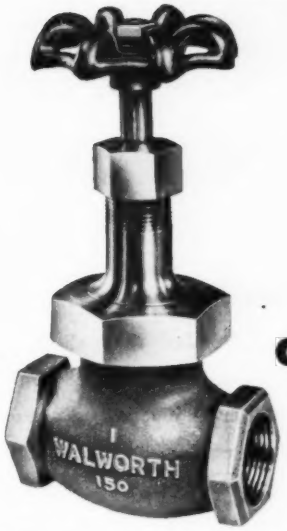
Hexagonal Union Bonnet Connection: Eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and assembled.

New Cylindrical Disc Holder: The design of the top portion of the disc holder keeps the disc accurately guided under all operating conditions.

Renewable Asbestos Disc: This disc is suitable for steam up to 500F and is resistant to oil, gasoline, and many chemicals at atmospheric temperatures. Discs for special services are available.

Extra Strong Body: Made of Composition M (ASTM B61) bronze thick enough to provide a high safety factor. Valves undergo hydrostatic shell test of 450 psi.

WALWORTH



IMPROVED
No. 95
BRONZE
GLOBE VALVE

also available in Angle Type (No. 96)

The service ratings of the Walworth No. 95 are 150 pounds per square inch steam at 500F, and 300 pounds per square inch non-shock cold water, oil, and gas. In the manufacture of this quality bronze valve, more than 47 gages are used in machining parts to micrometric accuracy, thus insuring interchangeability of parts. For further information see your local Walworth distributor, or write: Walworth Company, 60 East 42nd St., New York 17, N. Y.

note these 7 Great Features

WALWORTH
valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1949.

Say...

you left your motor running!

Do you run your motor 24 hours a day, every day? That's all right, if it's a Fairbanks-Morse motor, you can leave it on the job and forget about it. Fairbanks-Morse motors are built to take on the toughest assignments, to give the finest, trouble-free service. They require minimum attention . . . they assure lowest maintenance costs. Complete information about the full line of Fairbanks-Morse electric motors is contained in the handy POCKET PANORAMA. Write to Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE

A name worth remembering

OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES • DIESEL ENGINES
PUMPS • SCALES • MOTORS • GENERATORS • STOKERS • MAGNETOS
RAILROAD MOTOR CARS, STANDPIPES • FARM MACHINERY

CRACK DOWN on TUBING WASTE

DISTRIBUTE WEAR—SAVE THE TUBING! INSTALL THE

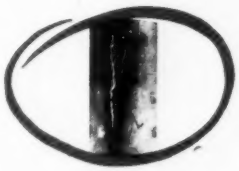
MEXIA TUBING ROTATOR

Excess wear at single points within the tubing . . . which occurs wherever holes veer off the vertical, and which, in many wells, forces the continual pulling and replacing of joints . . . can be eliminated—once and for all!

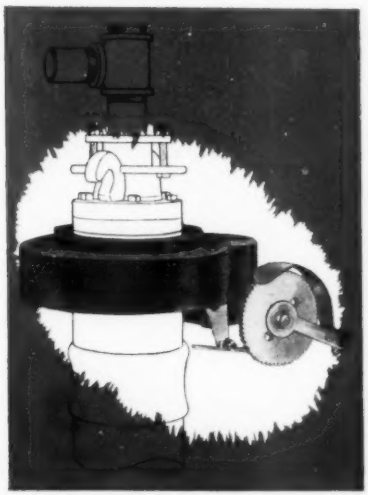
The Mexia Tubing Rotator, installed between the usual casing head and the tubing holder, rotates the tubing at a speed of one revolution every 15 to 20 hours, distributing wear and assuring a full lifetime of service from every joint throughout the string.

The first Mexia Tubing Rotator has been in use for more than 15 months in the water-laden Mexia field, where holes are extremely crooked. Following is the record of its 100% success.

Slow, Constant Rotation Prevents Premature Splits



. . . assures maximum tubing life



Before Installation . . .

split tubing, in the well concerned, was constantly being pulled and replaced, adding up to a completely new string every 10 to 12 months.

Since Installation . . .

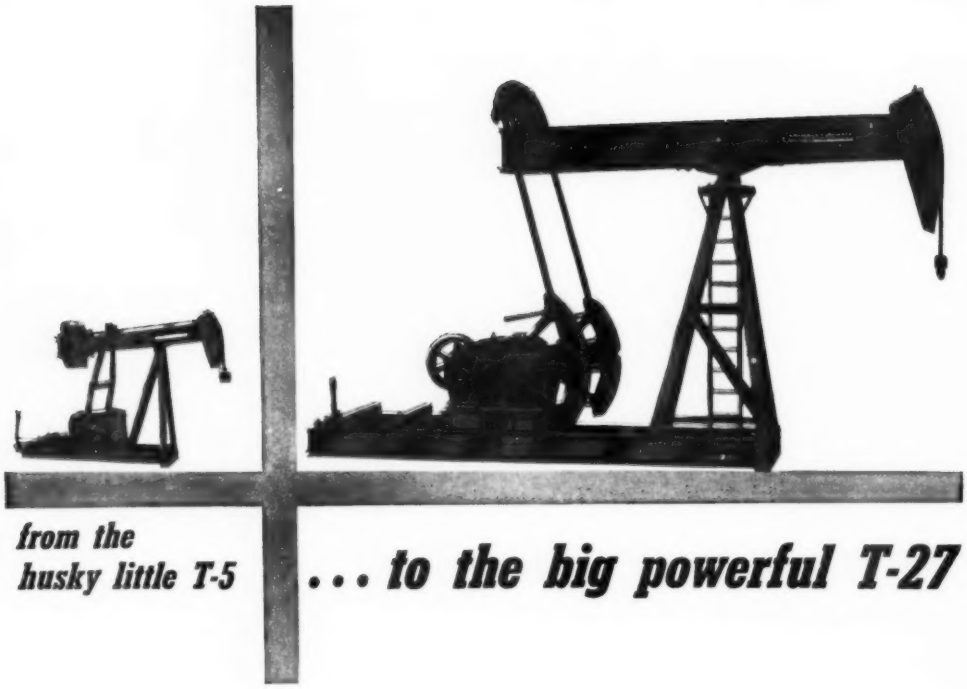
during the entire 15 months, this well has been pumping constantly without *one single tubing job!*

GET COMPLETE INFORMATION

Write to

MEXIA TUBING ROTATOR COMPANY

Box 884 Mexia, Texas Phone 868



from the husky little T-5 ... *to the big powerful T-27*

AMERICAN Units

... reduce pumping costs

Whether the job is large, small, or in-between, there is an American Pumping Unit the right size to give longer service with less servicing. Various combinations of structures and reducers make available a wide range of Units from which the most economical application can be selected.

American Units are designed to A.P.I. standards. Specify American ... proven by 25 years of service to the oil industry.

Contact your favorite supply store or the nearest American office NOW

25th Year

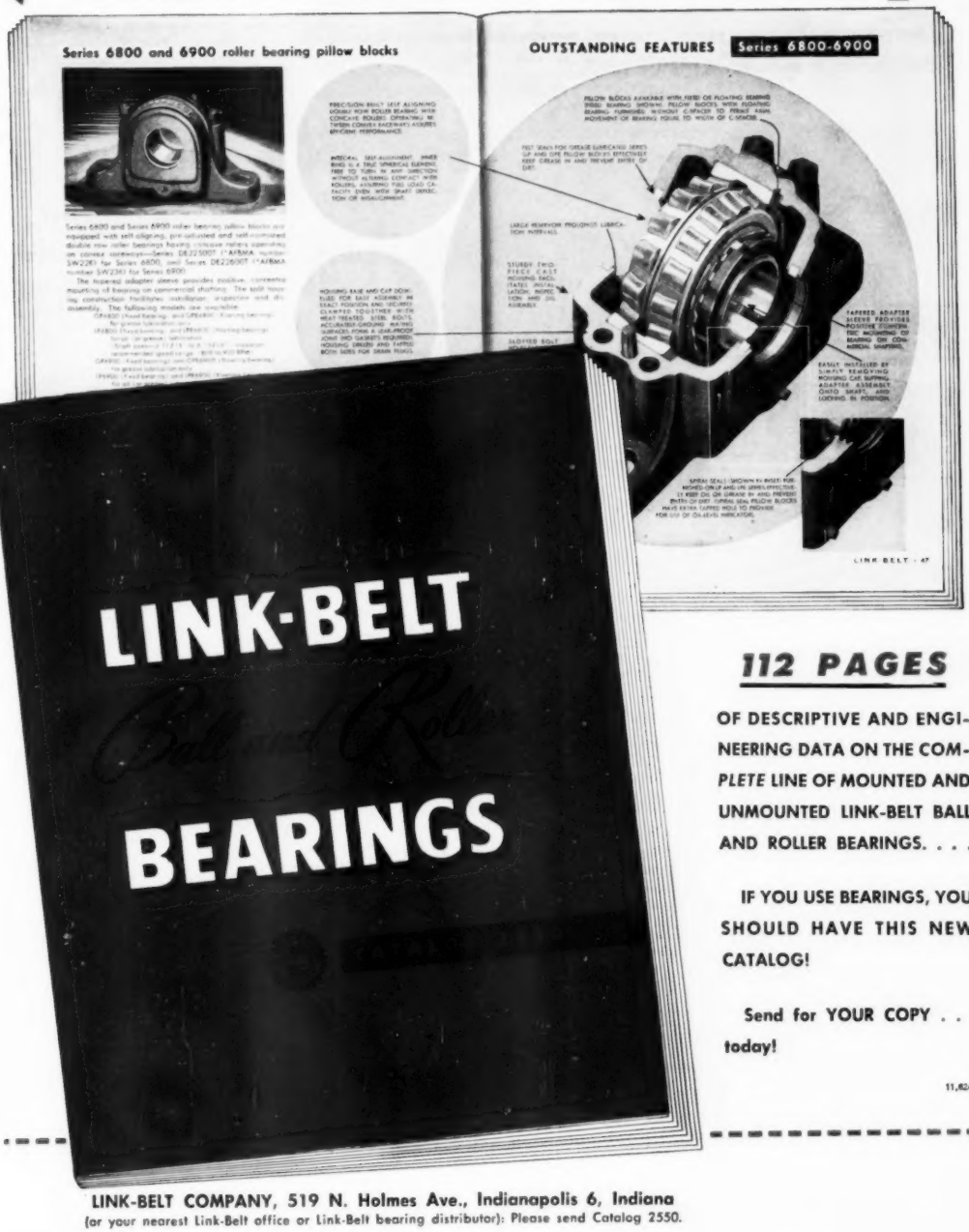
Houston, Tex., 320 West Bldg., Phone Ch 4-3301
Kilgore, Tex., Ph. 138 Odessa, Tex., Ph. 3472

Export Office:
500 Fifth Ave., New York, N. Y.

AMERICAN MANUFACTURING COMPANY OF TEXAS

FORT WORTH, TEXAS PHONE 8-2301

YOUR COPY is Ready!



112 PAGES

OF DESCRIPTIVE AND ENGINEERING DATA ON THE COMPLETE LINE OF MOUNTED AND UNMOUNTED LINK-BELT BALL AND ROLLER BEARINGS. . . .

IF YOU USE BEARINGS, YOU SHOULD HAVE THIS NEW CATALOG!

Send for YOUR COPY . . . today!

11,624A

LINK-BELT COMPANY, 519 N. Holmes Ave., Indianapolis 6, Indiana
(or your nearest Link-Belt office or Link-Belt bearing distributor): Please send Catalog 2550.

NAME _____

FIRM _____

STREET ADDRESS _____ **CITY** _____ **ZONE** _____ **STATE** _____

"Distribution is the term used in American business to embrace all the activities employed in finding customers for goods and services and in moving goods, both geographically and through the channels of trade."

UNITED STATES CHAMBER OF COMMERCE

". . . here's MY warehouse and I have 79 of them -- each saving oil men untold amounts through conveniently located, one-stop service."

Performing a Vital Mission to the Oil Industry...

You could never get the full value of mass production if there were not also mass distribution. For, no matter how well a product is made or how cheap it is to buy, no one benefits until the product is sold and put in use.

The mission of Jones & Laughlin Supply Company is to make better products more conveniently available. This we do with 79 stores and 17 offices. Once a store is opened it eliminates unnecessary travel, delay or expense in buying the things you need. In truth, each oil man in each store area can say, ". . . here's MY warehouse"!

You are cordially invited to share the advantages and convenience of buying at your nearby Jones & Laughlin Supply store, where mass distribution provides one-stop service. Accept this invitation and enjoy the difference when you place your next order. You'll find your problems understood and your business appreciated.

JONES & LAUGHLIN

J&L STEEL

SUPPLY COMPANY

Subsidiary of Jones & Laughlin Steel Corporation

TULSA, OKLAHOMA

EXPORT: 230 PARK AVE., NEW YORK 17, N. Y., U. S. A.

"Important" Details

Although Swage Nipples and Bull Plugs cost little by comparison, the jobs they perform are vitally important. Specify only the very best and save time, money and worry. Specify Larkin Forged Steel Swage Nipples and Bull Plugs.

- Uniform Sizes and Lengths
- Strong, Accurate Full Cut Threads
- Quality Seamless Forged Steel
- Zincoted Inside and Out Against Rust and Corrosion
- Packed in Damaged-Proof Corrugated Cartons.

LARKIN

...Through Your Supply Store

Larkin Bull Plugs and Swage Nipples come packed in strong corrugated boxes for ease of handling and complete protection

Hexagonal fittings are furnished in sizes 1" and smaller so that they may be tightened with an open end wrench. This is a definite convenience, especially, in close work.

972 DAYS OF OPERATION

out of a possible 1040 with MURPHY DIESEL POWER

And none of the days missed were due to engine failure! The pair of Murphy Diesels referred to were put in service on a drilling rig February 18, 1948 by the Panoma Corporation, Amarillo, Texas. By December 23, 1948, these engines had operated 972 days out of a possible 1040. This represented 23,328 hours of operation for each engine, 110 wells drilled and 295,909 feet of hole — without a major engine overhaul. Can *your* engines match that record of dependability?

Before you power a new rig or repower your existing one, find out what Murphy Diesels can do *for you.*

MURPHY DIESEL COMPANY
5305 West Burnham Street • Milwaukee 14, Wisconsin
OIL INDUSTRY FACTORY BRANCH, Sales, Parts, Service:
113-117 South Elwood Street, Tulsa, Oklahoma

MURPHY DIESEL

• Murphy Diesel Engines and Power Units for drilling and pipeline pumping: 90 to 220 H.P.; Generator Sets: 60 to 133 K.W.

Rugged and Handy For Small Rigs!

MARTIN-DECKER Production Model "Sealtite" Clipper Weight Indicators Keep Gauges Off Dead Line — Last Longer

Back view showing "Sealtite" construction and Hi-Pressure Hose

The Portable Model

14" x 17" x 12"

So compact that it can be easily moved from rig to rig. Comes with handles on top and two-inch pipe collar in bottom. It is installed on a post in front of the drawworks for maximum convenience. Can be mounted permanently on mast or derrick if desired.

A Martin-Decker Production Model Weight Indicator Gauge can be placed anywhere you want it—at the brake, in front of the driller, over next to the line permanently attached to the mast where it can be **seen** by the driller—without danger of damage from dead line vibration or whip, and with it you can read your loads with precision in pounds. Equipped with supersensitive Vernier for maximum sensitivity and readability. Vacuum loaded at the factory and permanently sealed. Easy to install and move. No adjusting, no pumping up. Write for descriptive literature!

HOME OF THE WEIGHT INDICATOR

MARTIN DECKER CORP.

LONG BEACH, CALIFORNIA

SAN JOAQUIN VALLEY: T. I. CULLEN, BAKERSFIELD, CALIFORNIA
MID CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS

Portable Installation

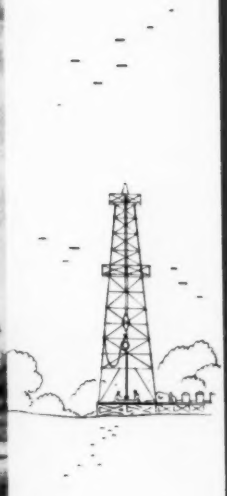
A Portable Model Clipper "Sealtite" installed on an Ideco H 40 Rig. Portable models are ideal for any small space. Dimensions 14" x 17" x 12". Note convenience of handles. Can be installed permanently if desired.

Permanent Installation

The Clipper "Sealtite" above is permanently installed on a Hopper Blitz trailer-mounted rig. Lowering the mast and moving in no way interferes with this installation.

Eliminates Dead Line Whip

This unretouched photo of dead line whip above was made on a well in West Texas and forcibly illustrates the sort of service to which the Toolpusher or Unit Type Weight Indicator is subjected. Only the rugged diaphragm of the Production Model Clipper "Sealtite" is subjected to dead line vibration and whip as the Gauge is safely installed in the steel box at the driller's position.



a great name of . . .

. . . dependability

The installation of United Pumping Units assures trouble-free operation and a minimum of maintenance. The reason: United's design is superior, structurals are heavier, stronger; and United's gear box with D. O. James continuous tooth herring-bone gears is of the sturdiest construction. All moving parts are lubricated by United's practical lubrication system and the roller bearing wrist pins are grease packed. For a tough unit, built to "Take It", to give uninterrupted, dependable service BUY UNITED.

Uncle Sandy THE UNITED SUPPLY MAN

Courtesy
Service
Dependability

UNITED SUPPLY
AND *Manufacturing* COMPANY
TULSA, OKLAHOMA
Stores in Kansas, Oklahoma, Texas,
Louisiana, and New Mexico

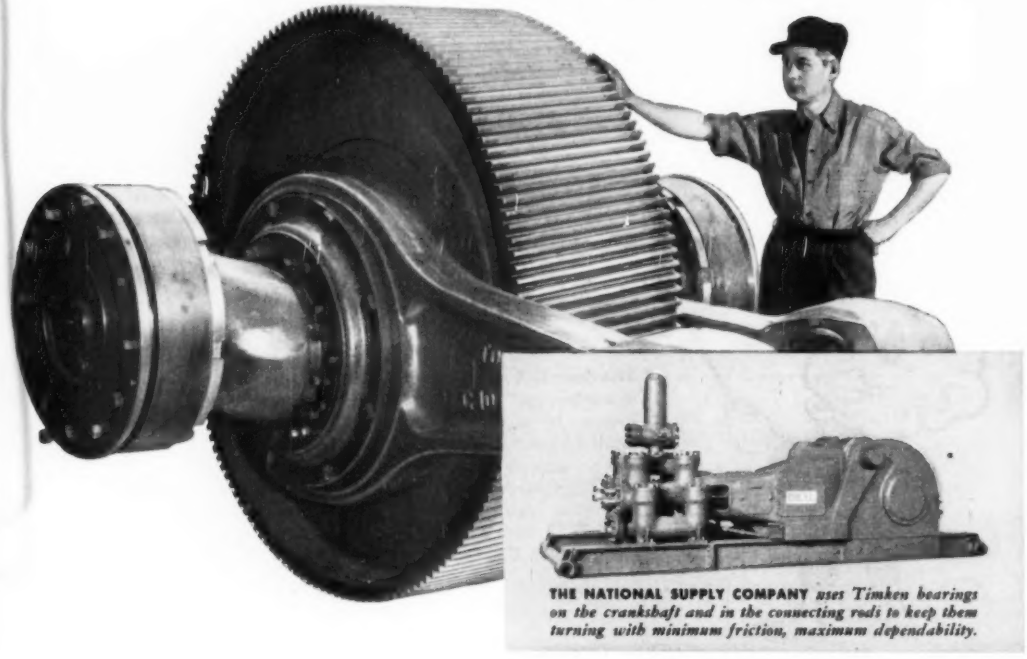
How to improve a mud pump's circulation with TIMKEN® bearings

TO help their customers get the most out of this new Ideal mud pump, The National Supply Company mounts the giant crankshaft on Timken® tapered roller bearings. Timken bearings take the heavy radial and thrust loads, minimize friction, and insure long, trouble-free operation. Because the crankshaft is held in proper alignment, driving gear teeth mesh smoother—resist wear better.

Due to line contact between rolls and races, Timken bearings have extra load carrying capacity. Tapered construction enables Timken bearings to take radial and thrust loads or any combination of the two. Power loss is minimized because Timken bearings operate with negligible friction, thanks to true rolling motion and an incredibly smooth surface finish.

Over the years, the dependable performance of Timken bearings have made Timken bearing equipped products first choice throughout industry. Timken bearings in *your* product add a valuable sales feature—build greater acceptance among customers. When you specify tapered roller bearings for the equipment you make—or the equipment you buy—specify "Timken". Look for the trademark "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



THE NATIONAL SUPPLY COMPANY *uses Timken bearings on the crankshaft and in the connecting rods to keep them turning with minimum friction, maximum dependability.*

DESIGN LEADERSHIP

The first Timken tapered roller bearing was produced in 1898. Since then the one-piece multiple perforated cage, wide area contact between roll ends and ribs, and every other important tapered roller bearing improvement have been introduced by The Timken Roller Bearing Company.

The Timken Company leads in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

TIMKEN 1899 50 1949 YEARS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

IN ANYBODY'S LANGUAGE-

Bethlehem Wire Rope Means Low Cost Per Unit of Work

In country after country all over the world Bethlehem wire rope has consistently proved its basic economy. Reason: its long life in service, which means low cost per unit of work—the only *true* yardstick of rope costs.

Every wire rope will do a certain amount of work, and it is often possible to record this in terms of definite units. That is, throughout its life the rope will move so many cubic yards of rock, or haul so many loaded cars up a hill, or lift and lower so many tons of drill pipe through varying distances, etc. Obviously, the rope cost should not be measured by purchase price alone, but by the cost of each unit of service the rope gives you.

In other words, the rope with the low price tag may look like a bargain, yet render such limited service that the cost per unit of work is high. On the other hand, a quality rope—costing more at the time of purchase, perhaps—can be a *real* bargain because of the long-term, efficient job it does.

Bethlehem wire rope is a quality product, made by craftsmen in one of the world's finest mills. It is built to give the user *low* cost per unit of work . . . to give him his money's worth and more. You can buy it with confidence; use it with the knowledge that it will serve you long and well.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

ATTENTION, NORDSTROM VALVE USERS:

LUBRICATE $\frac{1}{10}$, $\frac{1}{20}$, $\frac{1}{50}$, $\frac{1}{100}$ AS OFTEN

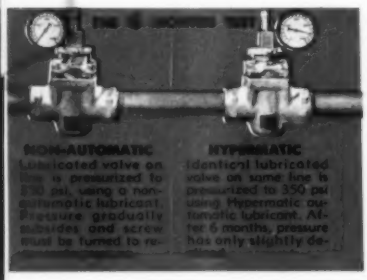
with Hypermatic

THE miracle LUBRICANT

Automatic lubrication—

SAVES MAN-HOURS, SAVES LUBRICANT

The immediate and eager acceptance of Rockwell Hypermatic lubricant has been phenomenal. Now, more than 5,000,000 Nordstrom valves can be automatically lubricated by changing to Hypermatic. There's nothing to purchase but the lubricant. Impressive savings in man-hours will be made in servicing your Nordstrom valves because Hypermatic works while your maintenance men are absent. It automatically force-feeds and seals any voids which would cause leakage. It stays energized for prolonged periods of time. Less lubricant is used because the valve is not over-lubricated but is fed the precise amount for perfect lubrication. In the event of an emergency closure the valve is always ready to be operated. The maintenance man will not have to stop and refill the chamber with lubricant before turning the plug. Hypermatic maintains automatic energized action as long as the pressure of the lubricant is above 50 lb.



NON-AUTOMATIC Lubricated valve on line is pressurized to 350 psi, using a non-automatic lubricant. Pressure gradually subsides and screw must be turned to re-

HYPERMATIC Identical lubricated valve on same line is pressurized to 350 psi using Hypermatic automatic lubricant. After 6 months, pressure has only slightly de-

THE SCAVENGER TEST

Inject Hypermatic in any horizontal valve. Turn plug half open. Then scrape away all lubricant in the plug's exposed vertical groove. Close valve. Wait a few seconds. Then turn half open to expose grease in port. Presto,— new lubricant has completely filled the groove.

Hypermatic **IMPOUNDS POWER—** *like a door check*

A self-closing door stores energy in the check body when you open door and uses this energy to close it. When you force in lubricant it causes Hypermatic to store energy for later use.

ROCKWELL Hypermatic LUBRICANT

TRADE MARK

PATENTS APPLIED FOR

energizable

Buy it—Try it—Keep upkeep down

Immediate deliveries

Rockwell Hypermatic lubricant is available in the principal types for most services at normal temperatures. It comes in stick form and soft bulk. You may order through nearest distributing point or direct. Be sure to specify Hypermatic.

Genuinely automatic

Hypermatic is of itself automatic—not dependent upon pressure in the pipeline which can fail, or any mechanical contrivance. It stores its own energy.

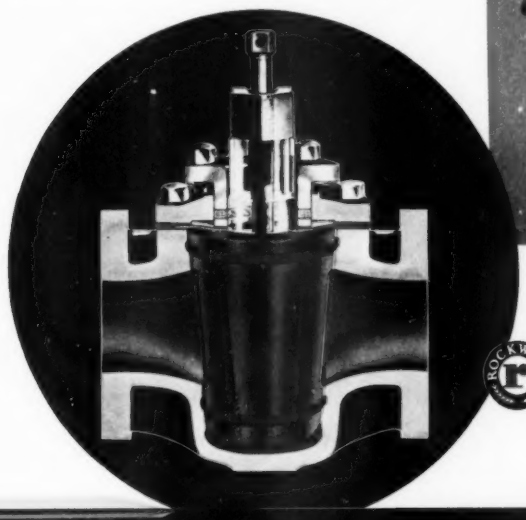
-a hit!

Hypermatic seals instantly and keeps valves sealed

The reason there are over 5,000,000 Nordstrom valves in service is because they are the most dependable type of positive closure known to industry. Lubrication performs the triple function of lubricating the plug, sealing the ports and jacking the plug. Lubrication is the "making" of the valve. There's no substitute for lubricant. It's vital. Now, we have miraculously improved the lubricant by development of Hypermatic. Fundamentally, a valve is used to shut off a line. To do that, a valve must be in itself a perfect seal. Hypermatic, with its impounded energy, keeps the valve sealed.

Gives Nordstrom valves greater efficiency, longer life

Nordstrom put pressure lubrication into plug valves, permitting practical use of this type of valve in industry. Then "Sealdport" lubrication was added so that the ports were securely sealed on all sides. Then other major improvements were brought forth, such as the Hypreseal design, Merchrome coating, use of stainless steel and special alloys. NOW the greatest of valve advancements—Hypermatic automatic lubrication—gives to Nordstroms the effect of an improved design.



WHY PLUG VALVE LUBRICATION *is vitally essential*

1. ROTARY ACTION, MOST POSITIVE CONTROL

Simplest valve design is a tapered plug. When properly lapped and fitted, it forms a tight closure, but it must be lubricated to insure easy turning and tight sealing.

2. PLUG SURFACE SEATED ON LUBRICANT FILM

The Nordstrom valve employs pressurized lubrication which evenly distributes a film over the entire seating surface which is never exposed to the line. Easy turning is assured.

3. POSITIVE PRESSURE SEAL AROUND EACH PORT

Nordstrom "Sealdport" lubrication, by ingenious locating of connecting grooves in the plug and body, forms a pressure seal around each port which prevents internal and external leakage.

4. HYDRAULIC JACKING ACTION FREES PLUG

A few turns of the external lubricant screw regenerates pressure. If the plug is too tight to turn easily, a few extra turns of the screw hydraulically jacks the plug, freeing it.

5. HYPERMATIC LUBRICANT SELF-ENERGIZES FILM

As the "missing link" in perfect valve operation, Hypermatic lubricant now gives to Nordstrom valves automatic lubrication. Being self-energized by screwing down the lubricant screw, Hypermatic stores powerful energy to maintain constant feed indefinitely—for months in cases where valves are infrequently operated.

6. INSTANT CLOSURE IN EMERGENCY OR OTHERWISE

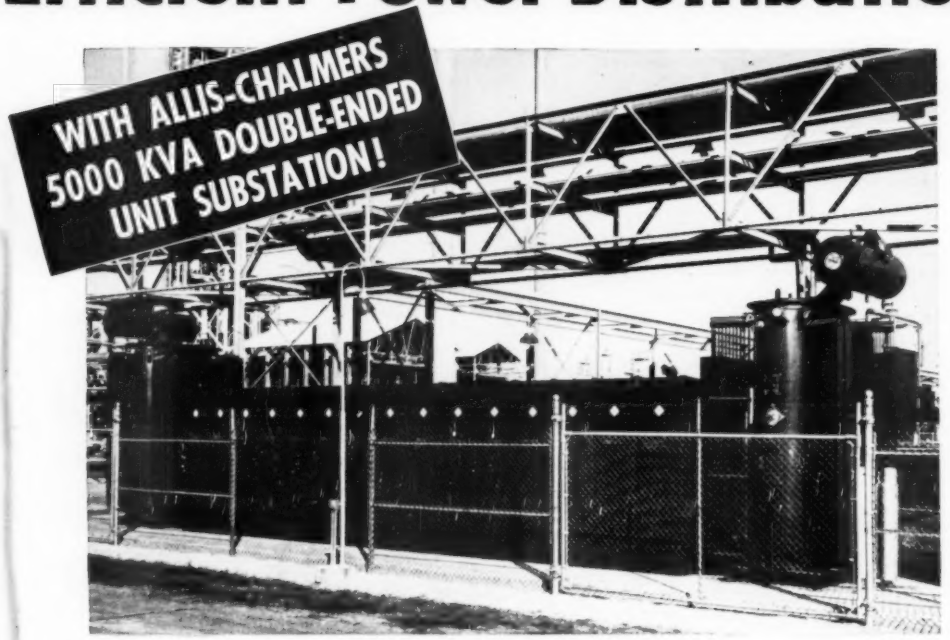
No longer is it necessary to refill an unserviced valve with lubricant before operation. By using Hypermatic, the valve is kept fully lubricated, ready to open or close instantly.

Hypermatic — Greatly Multiplies Valve Life by Maintaining Valves in Fully Lubricated Condition—Seven Main Reasons

Nordstrom LUBRICATED VALVES

NORDSTROM VALVE DIVISION—*Rockwell Manufacturing Co.*
400 North Lexington Avenue • Pittsburgh 8, Pennsylvania
Atlanta, Boston, Chicago, Columbus, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa . . . and leading Supply Houses • Export: Rockwell Manufacturing Co., International Division, 7701 Empire State Bldg., New York 1

Shell Oil Refinery Gets Safe, Efficient Power Distribution



DESIGNED FOR QUICK INSPECTION—LOW MAINTENANCE

ELECTRIC POWER SUPPLY is protected and distributed at the Shell Oil company refinery, Deer Park, Texas, by this 5000 kva double-ended Allis-Chalmers Unit Substation consisting of two 2500 kva transformers and a 12 feeder section of switchgear.

Shell Oil company gets these results: ▸ pleasing appearance; ▸ maximum safety for workmen; ▸ reduced maintenance and inspection; ▸ compactness; ▸ flexibility for expansion.

Every part of this Allis-Chalmers Unit Substation is built with attention to details of construction and arrangement that result in maximum protection . . . quicker inspection . . . reduced maintenance.

Devices like potential and control transformers that are *drawout mounted* for greater accessibility — finger-type disconnects located on the *removable breaker element* for ease of inspection — are good points to compare when buying unit substations for your electric power distribution system.

You gain initially with less paper work, quicker installation for added economy. Allis-Chalmers assumes undivided responsibility for performance of the *complete* substation! Call your nearby A-C representative. Or, write direct.

A-2873

ALLIS-CHALMERS, 1059A SO. 70 ST.
MILWAUKEE, WIS.

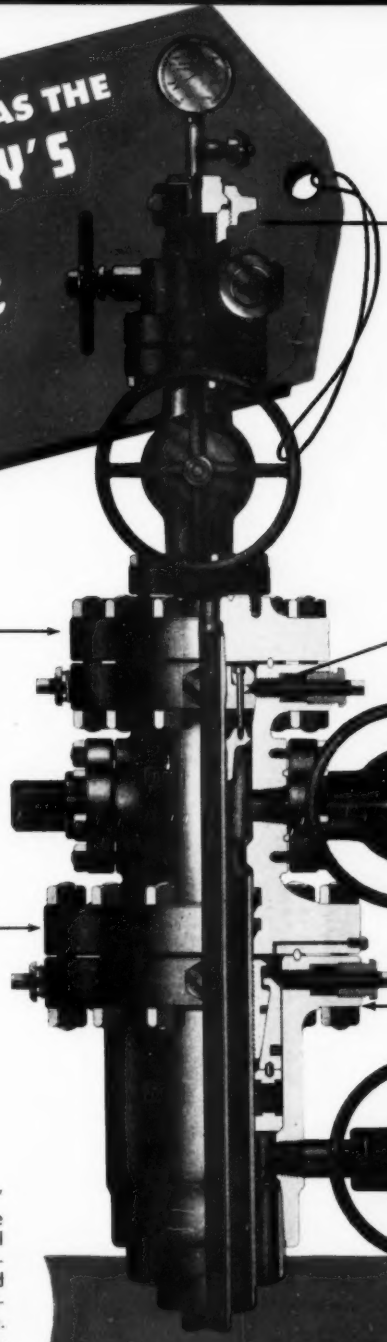
Texrope is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Power, Electrical, Processing Equipment for Petroleum Industry

LABELED BY MANY AS THE OIL INDUSTRY'S MOST PRACTICAL WELLHEAD ASSEMBLY



JE-1 Flow Control . . . four pieces in one — quick change wing valve.

WA-4 Tubing Hanger—economical, flexible, fast — no costly permanent investment in rams.

B-2 Bonnet.

T-16-OU Tubing Head — dual seal, reduced pressure area. Low flange stress.

C-19 Casing Head — self-sealing, flexible, safe, fast installation.

With the flexible O-C-T "C-19" Casing Head as the foundation . . . the only casing head that meets every well completion condition with a single compact model . . . this O-C-T Wellhead and Tree Assembly has set a new standard for simplicity, for safety, for service.

This O-C-T Wellhead and Tree Assembly is the result of progressive O-C-T engineering and field service experience based on sound study, exhaustive laboratory work and field testing, by experience-qualified O-C-T Engineers.

Yes, it's O-C-T quality from top to bottom . . . labeled by many as the oil industry's most practical wellhead assembly. Write for complete engineering details.

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

Oil Center Tool Co.

P. O. Box 3091, Houston, Texas

Export Representatives: Venezuela, Colombia, Peru, and Ecuador—Berry & Hall, Apartado No. 304, Maracaibo, Venezuela—Sterling Areas—La Grand, Sutcliff & Gell, Ltd., Southall, Middlesex, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas.

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IS NOW EXCLUSIVE DISTRIBUTOR

EAST OF CALIFORNIA FOR **BLACK MAGIC**

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BLACK MAGIC
oil base drilling fluid

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oil emulsion "rag hole" mud

OB WATE
weighting material

OB GEN
regenerates water-contaminated Black Magic

OB GEL
increases plastering properties of Black Magic

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increases viscosity and lowers fluid loss

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corrects faulty mixing oil

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regenerates crude-contaminated Black Magic

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Long recognized as the oldest organization in the petroleum industry devoted to reservoir engineering, Core Lab will represent Black Magic, White Magic and other mud conditioning products manufactured by Oil Base, Inc., in all territories east of California, including Canada. With 138 service engineers, 14 offices and 8 warehouses in the United States and Canada, Core Lab is excellently equipped to give prompt delivery and valuable service to all your mud requirements as well as efficient core analysis, drill cuttings analysis, diamond coring equipment, reservoir fluid analysis, production research and engineering studies.

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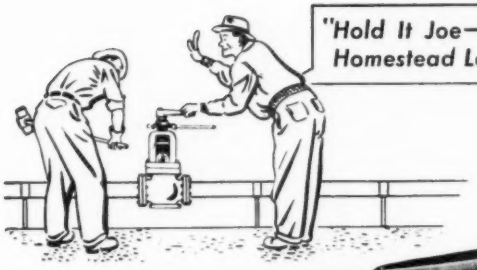


Homestead
LEVER-SEALD
Valves

ALWAYS WORK
LAST LONGER
COST LESS PER YEAR

STICKING valves are never a problem with Homestead Lever-Sealds on the job. Built into each valve is a powerful leverage, ready at all times to overcome the effects of corrosion, viscous fluids or temperature and pressure extremes which cause ordinary valves to stick or "freeze."

This powerful leverage not only relieves pressure between the seating surfaces to permit operation under all conditions; but it also is the means of providing the extra tight seal against leakage—the seal which keeps corrosive or erosive line fluids away from the seating surfaces; assures longer valve life and lowest cost per year.

Made in stainless steel, steel, semi-steel, bronze, monel or other alloys suitable for the working conditions under which they are to be used, Homestead Lever-Seald Valves may be had in sizes from 1" to 12"; and for working pressures from 150 pounds to 1500 pounds.

Choose the sizes and types for your services from Reference Book 39 Section 3. Write for your free copy today.

Check these Outstanding Features:

A QUARTER-TURN fully opens or closes valve.

INSTANT STICK-PROOF OPERATION. Plug turns freely after seating pressure is relieved by screw lever.

POSITIVE LEAKLESS SEAL is obtained by applying full seating pressure with screw lever after opening or closing.

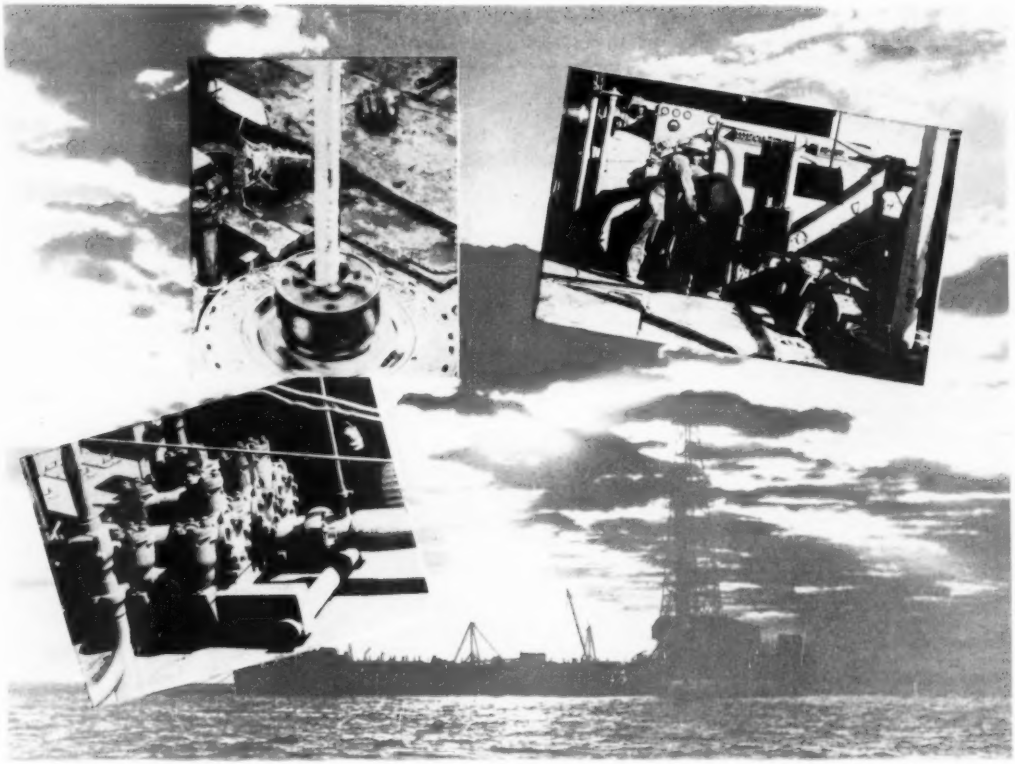
LEAK PROOF. Deep stuffing box, gland and sealed bottom prevent fluid loss, and reduce hazards.

STRAIGHT-LINE FLUID FLOW. Little or no pressure drop.

SEATING SURFACES ALWAYS PROTECTED in both open and closed positions. Fluid or grit cannot damage valve seat.

HOMESTEAD VALVE MANUFACTURING CO.

P. O. BOX 403 CORAOPOLIS, PENNA.



Dresser Team Picked for Offshore Job

The Kerr-McGee offshore operation at Cameron, in the Gulf of Mexico, teams the powerful Ideco Air-Flo Drilling Rig with the new Clark-Ideco Triplex Slush Pump.

Equipped with 1,300 HP, the Ideco Rig is as powerful as a diesel freight engine. Yet fingertip air controls centered at the driller's station are so sensitive that this rig was chosen for offshore work where vibration is especially destructive. There are nine speeds for hoisting drill pipe out and for turning the Ideco Oil Bath Rotary Table. Air clutches in the transmission smooth the engagement of all nine speeds by the mere twist of a wheel.

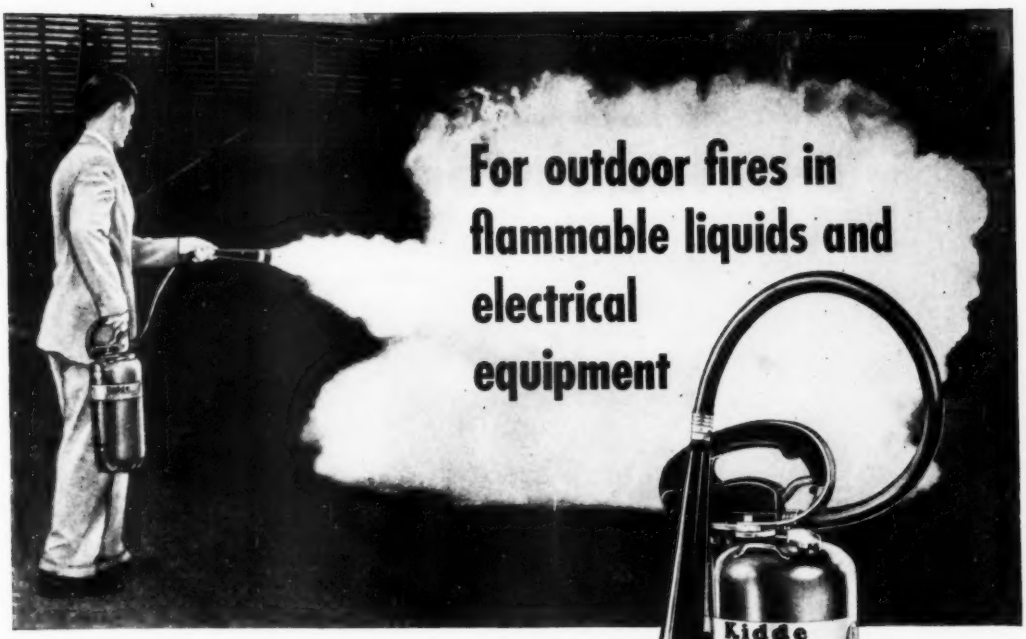
Teamed with the rig is the Triplex pump, most powerful unit available — more than a thousand gallons of drilling mud can be circulated every minute at 1,200 lbs., pressure. The unique triplex action smooths pumping impulses, resulting in less wear. It is the smoothest operating slush pump you can get and peculiarly suited to marine conditions. Complete details on any of this equipment are available in brief folders.

DRESSER INDUSTRIES INC.

TERMINAL TOWER • CLEVELAND 13, OHIO

THE ONLY COMPANY DOING AN OVER-ALL JOB } *from well to refinery for the Oil Industry— from source to consumer for the Gas Industry*

BOVAIRD & SEYFANG Manufacturing Company, Bradford, Pa. • **CLARK BROS.** Company, Inc., Olean, New York • **DRESSER** Manufacturing Division, Bradford, Pa. • **DRESSER** Manufacturing Company, Limited, Toronto, Ontario, Canada • **INTERNATIONAL** Derrick & Equipment Company, Beaumont & Dallas, Texas; Torrance, California; Columbus, Marietta & Delaware, Ohio • **KOBE**, Inc., Huntington Park, California • **PACIFIC PUMPS** Inc., Huntington Park, California • **ROOTS-CONNERSVILLE** Blower Corporation, Connersville, Indiana **SECURITY ENGINEERING** Co., Inc., Whittier, California • **STACEY BROS.** Gas Construction Company, Cincinnati, Ohio; **STACEY-DRESSER** Engineering Division, Cleveland, Ohio



A DRY CHEMICAL EXTINGUISHER WITH TRIGGER-FINGER CONTROL

Here's dry chemical at its fire-fighting best—in *Kidde-designed* extinguishers.

Kidde Dry Chemical Extinguishers use the same simple, familiar principle of Trigger-Finger Control made famous by its performance on *Kidde* Carbon Dioxide (CO_2) Portables.

Pressure of a single finger on the trigger of a *Kidde* Dry Chemical Extinguisher opens the valves—and makes it work. Release the trigger—both valves close.

Small port at bottom of CO_2 outlet tube allows gas to fluff up the dry chemical. *No packing of chemical in chamber.* Powder discharges at top of chamber, through siphon. *No packing at hose connection.* Trigger-Finger Control eliminates shut-off valve at horn. *No packing in hose.* Baffle in horn gives better dispersion pattern. Made in 20 and 30 lb. models.

These are the dry chemical extinguishers you want for most effective action against outdoor fires in flammable liquids and electrical equipment. Mail coupon for literature.

Kidde

Walter Kidde & Company, Inc., 1254 Main Street, Belleville 9, N. J.
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Walter Kidde & Company, Inc.
1254 Main Street, Belleville 9, N. J.

Gentlemen: Please send me literature on your dry chemical extinguishers.

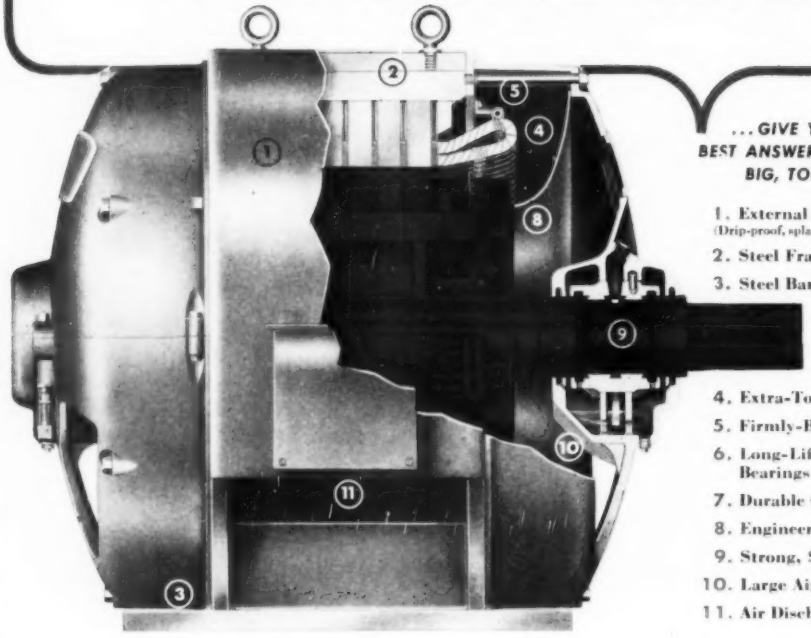
Name.....

Company.....

Address.....

City.....State.....

Eleven BIG features of E-M Induction Motors



...GIVE YOU THE ONE BEST ANSWER FOR HANDLING BIG, TOUGH DRIVES

1. External Protection (Drip-proof, splash-proof or fully enclosed)
2. Steel Frame
3. Steel Bar Feet
4. Extra-Tough Coils
5. Firmly-Braced Coil Ends
6. Long-Life, Cool-Running Bearings
7. Durable Cage Windings
8. Engineered Ventilation
9. Strong, Stiff Rotor
10. Large Air Intake
11. Air Discharge at Feet

Ever lock fenders with a commercial taxicab? Chances are your passenger car came off second best, because taxicabs are specially built to take that kind of punishment.

Big motors have to take punishment, too. They must have greater ruggedness and stamina than small motors. That's why it's significant that E-M Heavy-Duty Induction Motors are built by big-motor specialists—the same people who have made E-M Synchronous Motors a byword for toughness and reliability.

Just look at the design and construction features shown above. Each is a factor in the dependable performance of E-M Heavy-Duty Induction Motors, year in and year out. They explain why maintenance is held at a minimum when an E-M Heavy-Duty Induction Motor is on the job.

ELECTRIC MACHINERY MFG. COMPANY
MINNEAPOLIS 13, MINNESOTA

1300-TPA-2084

You'll enjoy reading our special issue of THE SYNCHRONIZER, "The ABC of Large Induction Motors." This 32-page booklet is written by G. L. Oscarson, our Chief Application Engineer, and presents a comprehensive, practical, fact-filled treatment of Induction Motor fundamentals. It is lavishly illustrated with installations, photographs, cutaway views of squirrel-cage motors, and has nearly fifty graphs with explanatory figures accompanying the text. Get a copy from your E-M man, or write us direct.

SPECIALISTS IN BIG MOTOR ENGINEERING

AO DURALITE Goggle

Gives Your Workers INDIVIDUAL PROTECTION for Each Eye

Year in and year out the AO 301A Duralite Goggle retains its popularity with grinders, chippers, riveters, machine and hand tool men because:

(1) It's light in weight for maximum comfort.

(2) Its individual eyecups are *molded to fit the contour of each eye* with smooth, rounded edges. What's more, there's ample ventilation to retard fogging of lenses.

Your nearest AO Safety Products Representative can supply you with this popular goggle which protects from particles striking from every direction.

QUICK FACTS:

Eyecups are low set for broad working vision—won't conduct heat or electricity.

Bridge is ball-chain type, easily adjusted and insulated with curved tubing.

Aluminum lens retaining rings won't corrode. Slots provide added ventilation.

One-piece rubber headband, easily adjusted.

50 mm. Super Armorplate or 6 Curve Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades.

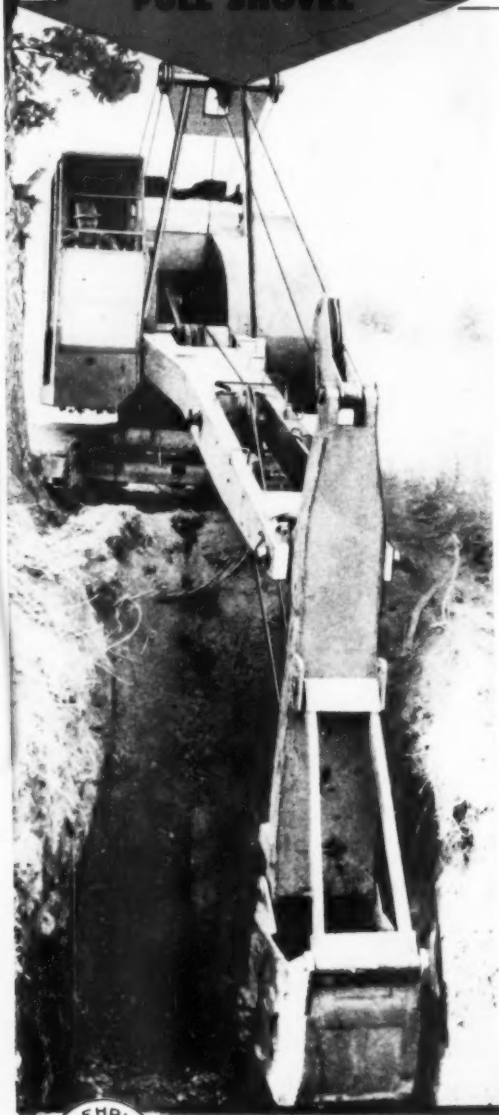
Rubber cushions available around edge of eyecups at slight extra cost.

American Optical
SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts • Branches in Principal Cities

HERE'S A POWERFUL PAIR OF TRENCHERS

KOEHRING 205 PULL SHOVEL



NO WEAVING with this rigid pull shovel front end

Extra strength, extra resistance to side-sway are built into the Koehring ½-yard 205 pull shovel. You get a straight, clean ditch in toughest oil field digging because this 205 pull shovel is mounted on a rugged heavy crowd shovel boom. Front end will not weave . . . dipper doesn't turn away from the cut, because broad, shovel-type boom point gives a wide connection to the rigid pull shovel dipper arm. Its long, deep digging reach (15'3" below tracks), powerful ½-yard bite, fast swing and easy dumping mean more feet of pipeline trench per day.

dual-purpose boom saves time and money

Because pull shovel and crowd shovel use the same boom, this Koehring 205 combination saves time when you convert from one attachment to the other . . . and costs 20 to 25% less than conventional units that require two separate booms. What's more, crowd and retract cable is self-contained in boom, stays intact when boom is removed . . . saves more time when changing to dragline, clamshell, lift crane or pile driver.

Koehring heavy-duty 205 further assures more production at lower costs because you have independent traction, to travel, swing and operate boom all at same time . . . self-adjusting main clutches for peak operating efficiency at all times . . . choice of crawler, rubber-tired cruiser or truck mounting to suit your exact needs.

Your local Koehring distributor is experienced in oil field problems . . . will analyze your trenching, excavating and other materials-handling requirements in the interests of greatest efficiency, production and savings for you. See him today about Koehring heavy-duty ½-yd. 205 . . . ¾-yd. 304 . . . 1½-yd. 605 . . . or big 2½-yd. 1005.

KOEHRING HEAVY DUTY

KOEHRING COMPANY • MILWAUKEE 10, WISCONSIN

Subsidiaries: KWIK-MIX • PARSONS • JOHNSON

FOR HEAVY-DUTY OIL FIELD DIGGING

check these **Quick Facts** on what model 310 can do for you:

- 45 DIGGING SPEEDS . . . from 8″ to 186″ per minute . . . plus 5 reverse speeds. Travels 1¾ m.p.h.
- 7 CUTTING WIDTHS . . . 18″ to 54″. Special side-cutters provide full range with only 4 standard bucket sizes.
- TRENCHES TO 15′ DEEP . . . telescopic boom is easily adjusted for quick variation of digging depths.
- DUAL BOOMS . . . available for digging 72″ wide . . . at 10 depth.

Where you need extra rugged digging strength for toughest trenching assignments . . . extra range of digging widths and depths, this heavy-duty Parsons 310 ladder-type Trenchliner can earn important savings for you. Big and tough, with highest quality in every machine detail, Model 310 offers many big-production, cost-cutting advantages:

Maximum digging power is transmitted by roller-chain drive direct to bucket line. Heavy, cast alloy buckets are rib-reinforced . . . teeth are alloy steel forgings, heat-treated to resist wear. Spring-loaded, band-type safety clutch mounted on excavator drive sprocket operates automatically, cushions shock loads, protects machinery from abnormal strain. Digging boom automatically locks in any position to hold grade. Oscillating mounting keeps entire machine on even keel . . . keeps twists and strains from main frame . . . assures uniform ground pressure.

Get all the facts . . . see your Parsons oil-field distributor about this 310 Trenchliner . . . or write for bulletin.

PARSONS COMPANY • Newton, Iowa

Mail today to: **PARSONS Company, Dept. OG, Newton, Iowa.**

Please send bulletins on Trenchliner® models: ☐ 310 ☐ 250 ☐ 221 ☐ 200

NAME..... TITLE.....

COMPANY.....

STREET.....

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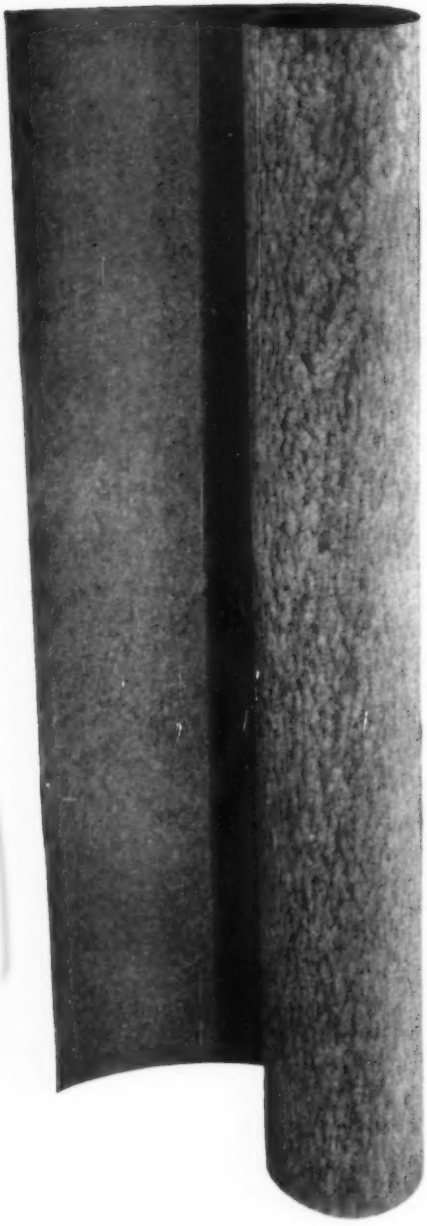
☐ Also interested in utility-size, rubber-tired, 18.5 m.p.h. Trenchmobile.

*Trademark Reg. U. S. Pat. Off. EPY22



R/M 10,000

Tensile Strength . . . 10,000 Pounds per Square Inch

The tensile strength of this exceptional compressed asbestos gasket sheet, R/M No. 10,000, is 10,000 pounds per square inch. No other sheet packing even approaches this. Due to extreme toughness and high tensile strength, it can be used wherever ordinary sheets will tear or blow out. 10,000 pounds takes a lot of tearing.

R/M No. 10,000 was developed for narrow flange gaskets serving under extra pressure, and is also recommended for heat exchangers, condensers, and high-pressure stills. However, the cost of a gasket is incidental compared to the cost of an unscheduled shutdown. The exceptional structure, quality, and tensile strength of this sheet make it the best choice for general service.

R/M No. 10,000 is an outstanding example of the products developed by R/M research and backed by R/M's fifty years of experience. For full information on all R/M packings for oil field, pipe line, and refinery service, see your oil field supply store or the authorized R/M packing distributor near you.

RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, MANHEIM, PA.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Packings • Asbestos Textiles Mechanical Rubber Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts Radiator Hose • Powdered Metal Products • Bowling Balls

R/M

They Say—

No Decay

"The automobile started us off as a great industry and since then we've grown about as fast as any industry ever grew. Then came the war . . . oil became the lifeblood of the country . . . we had a job to do, and we did it.

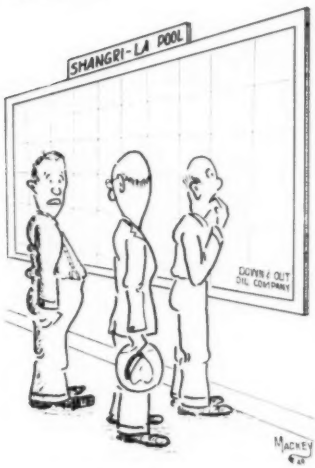
"When the war ended economists said, 'Well, now we're going into a slump.' But the pressure continued, and we had to work tooth and nail to meet demands.

"Then in the last part of 1948 we caught up with ourselves. The superhuman effort of the last years went into a decline. It was a case of overextending ourselves. Sooner or later we had to reach the saturation point.

"The picture we're looking at is that of a more stabilized industry, although still a virile industry. There's no sign of decadence or decay. We've reached a plateau in our growth, and our future looks fine."

M. J. Rathbone, director, Standard Oil Co. (N.J.), addressing Bayway Esso Executives' and Formen's Club, Elizabeth, N. J.

Tight Holes



"Our operations are so confidential that even we don't know where our wells are."

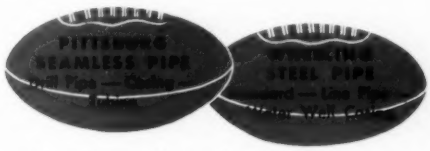
The Shell Roar, Shell Oil Co.

For More Tankage

"It appears to us the industry is relying less and less, proportionately, on storage and more on manufacturing facilities. Measured by the volume of its business, the industry looks

an all-American pair

Every coach feels justifiable pride when one of his boys achieves the coveted All-American designation. And so are we proud to have been designated distributors for two best known lines:



These two famous lines . . . older now than many of the men who use them . . . are available to you through all Mountain Iron & Supply Stores.

Service First . . . Always!

Your Mountain Iron Store carries the most complete oil field supply stock in your area. You can buy everything you need at one stop. And keep in touch with your Mountain Iron salesman. He will work with you in anticipating your needs for delivery as required.

LOCATED FOR YOUR CONVENIENCE

Our plans are flexible to meet the needs of the industry. Present stores in Kansas are located at Madison, McPherson, Chase, Russell, and Plainville. Others will be added as conditions demand and your suggestions will have friendly consideration.

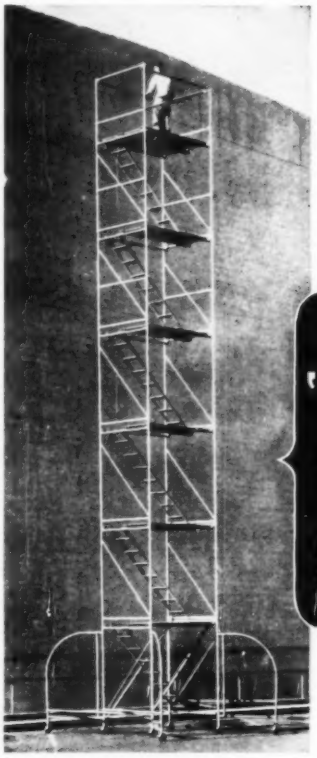
MOUNTAIN IRON

Mountain Iron & Supply Co.

Oil and Gas Well Supplies

714 FOURTH NATIONAL BANK BUILDING
Wichita 2, Kansas

Stores in Kansas: Madison, McPherson, Chase, Russell, Plainville
Store: Parkersburg, West Virginia



"75% SAVED on TANK and OVERHEAD MAINTENANCE"

Reports Superintendent G— WITH *Revolutionary* NEW

Aluminum Alloy

"UP-RIGHT" SCAFFOLDS

and

ROLL-AROUND SAFETY CAGE

Mobile 45' unit takes only 15 minutes to erect!

Scores of petroleum industry users report big labor savings on tank painting, inspection, control, gaging and general overhead maintenance with Up-Right Scaffolds and Roll-Around Safety Cage.

Scaffolds are available in desired number of 6-foot and shorter section units for rapid, easy assembly. Roll easily from position to position throughout job. Stronger than structural steel yet one third the weight. Safety tread stairway completely within structure. No wrenches, wing nuts, bolts, loose parts. Each section folds flat.

Roll-Around Safety Cage, anchored to eye-bolt on top of tank, provides a new, faster method for covering entire wall areas of tanks. Weighs only 70 lbs., and its unique design permits the use of pole guns and bulky maintenance equipment. Unusual safety features include widely spaced legs which eliminate wind hazards. →

Write for detailed Information

UP-RIGHT SCAFFOLDS

Dept. 130 • 1013 Pardee Street • Berkeley, Calif.

Factories: **Berkeley, Calif., and Teterboro, N. J.**

Offices in all Principal Cities

to be carrying actually less, not more, inventory. The industry seems to be building new manufacturing plants at costs incomparably above the $2 a barrel for new storage, and counting instead on greater manufacturing flexibility to make what it needs when it needs it—if it needs it—rather than building up means of stocking large quantities of materials. . . .

"It, of course, is true that every additional barrel of tankage and of inventory owned by the industry imposes some additional burden of carrying costs and suggests some sacrifice of ability to make quick turns.

"But it must be remembered that public and government look increasingly on this industry as a great service institution. Particularly does the expansion of oil heating entail responsibilities in this connection, involving, as it does, the uncertainties of weather and the urgent requirement of safety of supply whatever the cost."

Keith Fanshier, writing in the Chicago Journal of Commerce.

Imports

"There is no power to correct the flow of imports outside of voluntary recognition on the part of the importers for need of such action. With a world oversupply of oil outside the United States, I feel everyone should give thought to some orderly program.

"To the extent that we are short of supplies in the United States dependence upon outside sources becomes accentuated; to the extent that the American industry, including the domestic refiners and marketers, are dependent upon outside sources for their supply, they are dependent upon a few companies whose interrelationship in activities outside of the United States is such as to constitute substantially one source of supply. By such action we abdicate the competitive phase of our market to this small group of large companies."

Russell B. Brown, general counsel, of the Independent Petroleum Association of America, speaking in Washington.

Cayuga's Waters

"If you are a parent, and your lad is doing lousy in school, don't read this to him. It's about Gus Egloff (Editor's note: For the past 30 years an authority on petroleum technology) and Adolphe Menjou. They were classmates at Cornell in 1910. Gus was there because he was nuts about engineering. Adolphe was there because Papa Menjou put his foot down.

"GUS WON honors in engineering, plus the 125-lb. intercollegiate wrestling title. Adolphe was the campus star pool player, bowler and amateur actor.

"GUS GRADUATED IN 1912. He now is Chicago's walking petroleum encyclopedia. Once, when he was expert witness in a patent suit, an unwary opposition barrister tried to discredit him. 'What,' demanded the barrister, 'do YOU know about emulsion?' That lawyer has been kicking himself ever since because Dr. Gustav Egloff ad-libbed expertly on emulsions for the next 21 days.

"ADOLPHE DIDN'T GRADUATE. Long before 1912, the dean called him in and suggested Cornell was a terrible place to major in pool shooting.

"SO THE OTHER night Menjou was in town. Dr. Egloff rounded up his wife, and his secretary, and took 'em over to see his old classmate.

"'HI,' said the famous star of stage, screen and TV, 'how's your wrestling?'

"'HI,' said Dr. Egloff, 'how's your pool?'

"'NEVER,' they chorused, 'get time for it any more.'

"Wonder if there's a moral there someplace?"

Tony Weitzel's column, The Town Crier, in the Chicago Daily News.

Oil and Locomotives

"In 1941 about 80 per cent of the freight traffic of Class 1 roads, as measured in gross ton-miles of cars, contents, and cabooses, was handled by coal-burning steam locomotives as compared with 67 per cent in 1947 and only 59 per cent in 1948. In contrast, the diesel proportion of the total rose from only 0.22 per cent in 1941 to 12.37 per cent in 1947 and to 21.27 in 1948. Only slight relative changes occurred in the proportion of freight traffic handled by oil-burning steam locomotives and by electrics, although the trend was downward. . . .

"Despite the fact that diesel electrics handle more traffic than oil-burning steam locomotives, they consume much less diesel oil than the oil burners do fuel oil. The diesel locomotives cannot be charged with burning up our oil reserves. Due to their greater efficiency they utilize their fuel economically. It is estimated that if the railroads were completely dieselized they could be operated with a smaller gallonage of diesel oil than is now consumed in oil-burning steam locomotives alone. Such a transition would, of course, displace coal."

Memo prepared for the research committee of the Eastern Railroad Presidents' Conference.

Stable Crude Price

"The announced reduction in production allowables throughout the Mid-Continent area for the month of December will, from all indications, stabilize the price of crude oil for the balance of this year."

C. H. Wright, president, Sunray Oil Corp., in report to company directors.

"VIC" TELLS HOW

YOU GET 4-WAY SAVINGS WITH VICTAULIC COUPLINGS AND FULL-FLOW FITTINGS!...

1. TIME—faster, easier assembly of any piping system... because you can button up 2-bolt Victaulic Couplings in just a few turns of a standard T-wrench. Easier, faster repairs and salvage, too.

2. LABOR—no specially trained or skilled labor is needed when you lay pipe lines the fast and easy "Victaulic way."

3. MATERIAL—when repairs are needed, you can simply unbutton Victaulic Couplings and "lift out" any fitting or pipe length without backing off adjoining sections, without damage to pipe ends or fittings.

4. OPERATION—the wide, sweeping turns and true circular inner walls of Victaulic Full-Flow Fittings increase pipe-line delivery and lower pumping costs.

FOR A 5th SAVING—use our "VIC GROOVER." It grooves pipe ends twice as fast with half the effort of ordinary pipe threaders.

COMPLETE DETAILS are yours for the asking. Write today for Victaulic Catalog and Engineering Manual No. 44... and for "Vic-Groover" Catalog No. VG-47.

Sizes—¾" through 60"

FOR FULL ECONOMY...MAKE YOUR PIPING SYSTEM ALL VICTAULIC!

SELF-ALIGNING PIPE COUPLINGS
VICTAULIC
EFFICIENT FULL-FLOW FITTINGS

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Victaulic Co. of Can. Ltd. 200 Bay St., Toronto 1

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PORTER *Better-Built*
PROCESS EQUIPMENT

NOW FOR THE FIRST TIME...

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The New Look

YES, it's The Oil and Gas Journal you're looking at, even though the news pages don't look a bit familiar.

It's astonishing how much difference a few changes in type, headlines, and layout can make. All through our planning and "dry runs" for this change we kept saying to ourselves: "It certainly doesn't look like us . . . But we like it."

We're sure you'll like it, too, after the first shock of unrecognition wears off. Kind of like seeing your wife for the first time in a whole new outfit and hairdo; at first it seems strange, but after a second look you like it.

Our new dress, we feel sure, has a lot more "eye appeal" than the old. We think the pages look neater, cleaner, and what the printers call "less busy." The headlines should be easier to read, and we are going to try to make them tell more in fewer words.

It's our new look for 1950, but we decided to rush the season a bit and bring you the new model right away, so here it is.

The Quick Look

BEAUTY is more than skin deep, and that's the way with our new look. There's a lot more to it than just some new type.

Our objective is to give you the important news of the oil industry in one quick look every week. That's why we're grouping our news items by subjects and running topical or regional headings over each group.

In this way you can briefly scan the news pages and learn at a glance what is happening, and then turn back and read more details on the things that interest you most. The device of a subject heading should make it a lot easier to locate a particular item you want to find.

Our 1950 model has a lot of other swell new features, also, but, unlike the automobile manufacturers, we are not bragging about them all at once. They are all designed to bring you more news and better news of the industry, easier to find, easier to read, and easier to absorb.

We'll be telling you more about these features as they unfold. Watch this space for further announcements.

Farming with Gas

A GUEST speaker on the A.P.I. program was a man from the electrical industry who told the hair-raising story of how the Government has moved in on private enterprise in his field by means of valley authorities, the Rural Electrification Administration, and other devices.

He didn't know it, but there is one natural-gas company which is doing something to forestall the creation of a "Rural Gasification Administration" in its region. This is Kansas-Colorado Utilities, Inc., of Lamar, Colo. Ignoring all the standard accounting rules about mass markets and peak-load payouts, it is undertaking to lay service lines to all farms in its area. It figures that the local good will thus created will offset the out-of-pocket losses involved in this construction, and that perhaps the farmers will develop so many new uses for natural gas on the farm that in the long run the experiment may pay off financially as well as politically.

Sloganeers

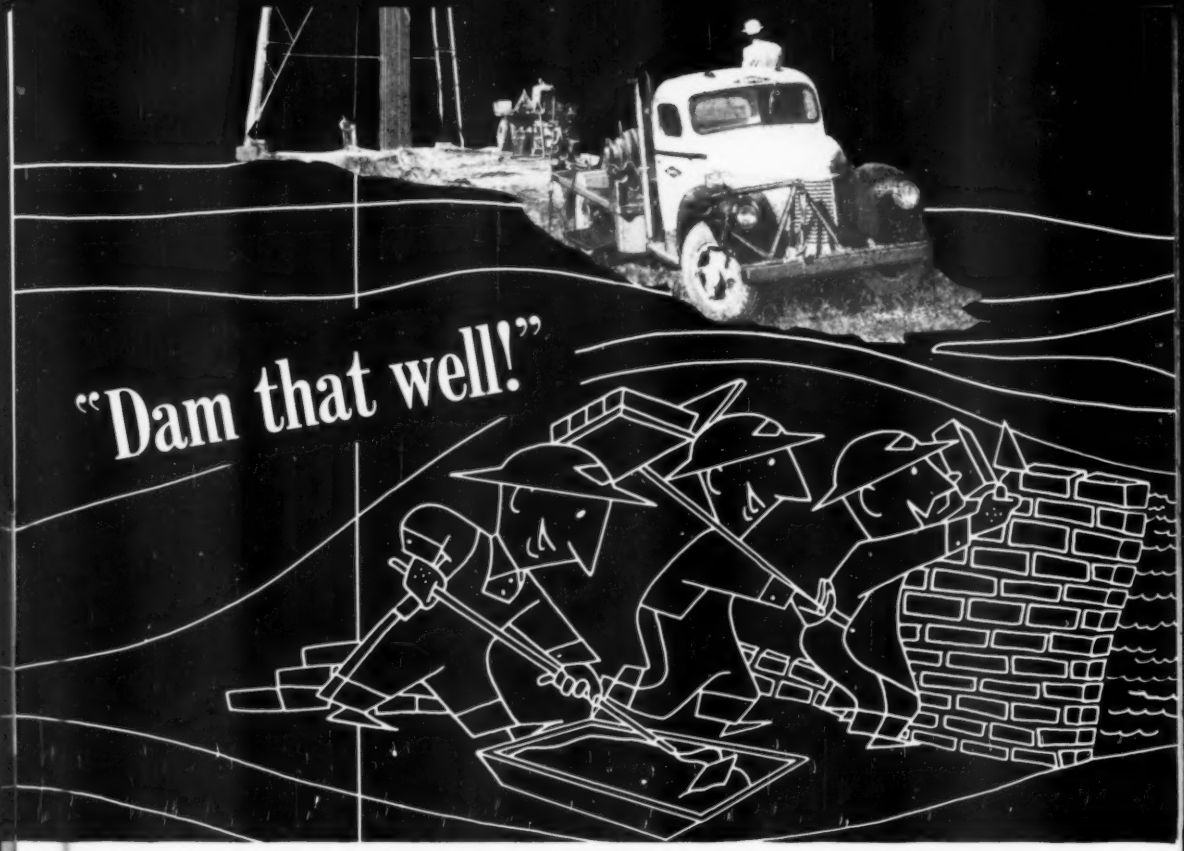
AT the A.P.I. we caught a member of the public-relations committee wandering around the corridor when his committee was in session.

"I'm mad," he explained. "They spent all morning arguing over inconsequential details. I'm not going back until they start living up to that slogan they have posted up on the wall."

That slogan, we had noted, read: "A committee is a group which keeps minutes and wastes hours."

Probably out of deference to the fact that their bosses sit on a higher body, the public-relations men refrained from mentioning that a board is long, narrow, and wooden.

Henry D. Ralph



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In This Issue

News

North Burbank to Be Mid-Continent's Largest Water-Flood Project 37
Sweet-Crude Output Is on the Increase in West Texas 38
Feasibility of Underground Storage of Propane Considered Proven 39
Congress May Be Asked to Impose Heavy Tax on Oil Imports 40
Bids Asked on Crude Oil to Help Japan Meet Shortage 40
Exploratory Campaign in Nevada to Continue Next Year 42
West Coast Quake Idles 86 Wells in Long Beach, Calif., Area 43
Texaco Opens Eagle Point Refinery 43
Stanolind Testing New Device to Record Vapor Pressure 46
Deep-Zone Drilling in Japan Watched by American Oil Men 47
Imperial Oil Seeking to Borrow $50,000,000 for Expansion 48
Good Producer Showing in Mexico's Isthmus Region 52
Two Companies Formed to Explore for Oil in Tunisia 53

Engineering-Operating

Esso Operates World's Largest Fluid Cat Cracking Unit 58
Equipment Selection for Water-Flood Pumping 60
Book Reviews 65-89
Factors to Consider in Selecting Mud Pumps 67
Shell's Sewaren Plant 70
Barnsdall's Newhall-Potrero Gas and Gasoline Plant 73
Squeeze Cementing 75
Stage Separation 79
Rig Electric Unit Performs Threefold Service Duty 88
Progress in Metals 90
Engineering Fundamentals—Reservoir Estimations 91
Cost-imating—Over-All Plant Costs—Distillation, Etc. 93

Exploration-Development

Midland Black Shale Basin of West Texas 113
Highlights of Week's Developments 113
Reports by Areas Start on Page 115

Departments

They Say 27
Journally Speaking 31
Editorial 35
This Week 36
Watching Washington 41
International News 47
Personals 54
Deaths in the Industry 57
Pipe-Line News 95
Pipe-Line Construction 98
Refining News 104
Drilling Contractors 107
Natural-Gas News 110
Natural-Gasoline News 110
Exploration Statistics 130
Production Statistics 131
Refining Statistics 132
Men in Equipment News 135
Classified Advertising 137
Calendar of Events 140
Advertisers' Index 140

When the Success of Your Well is . . .
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67-Gallon Barrel

CRUDE-OIL output in this country last week averaged 5,164,100 bbl. To many, production and changes in stocks of this raw material are the only figures that need be considered in appraising the petroleum industry's supply-demand status.

The rate of flow of crude oil from the wells has always been the basic activity of the oil business and still is. But in an increasingly important sense there are other supply data that must be considered if operations are to be maintained on a healthy basis.

To crude oil must be added about 500,000 bbl. daily of condensate, natural gasoline, and liquefied gases. So immediately the 42-gal. barrel of crude becomes in effect a 46-gal. barrel of liquid petroleum.

There has always been a tendency in statistical analyses to ignore these lighter products—often with disastrous results marketwise. Because of rapidly increasing production it is mandatory that they be considered in all efforts to preserve a balance in operations.

New plants and important additions to existing plants are being completed monthly and production is running about 15 per cent ahead of last year despite the fact that crude-oil output is approximately 8 per cent under a year ago. Over the past 10 years the output of cycling and natural-gasoline plants has increased more than 125 per cent while the gain in crude-oil output is slightly less than 50 per cent.

But the ever-present problem of balance unfortunately does not end with liquid products. Natural gas, which for years experienced a slow growth except in areas adjacent to the fields, is now expanding rapidly throughout a large part of this country. Public-utility sales so far this year are running 10 per cent ahead of 1948.

If we convert the estimated marketed production of natural gas totaling 15,477 million cubic feet daily to an oil equivalent on a basis of 6,000 cu. ft. per barrel, we arrive at a figure of 2,580,000 bbl. daily. Thus the current production of hydrocarbons is 8,244,000 bbl. daily, including crude oil, condensate, natural gasoline, liquefied petroleum gases, and natural gas. Our 42-gal. barrel becomes 67 gal.

Except for the small percentage of natural gas consumed in the manufacture of carbon black and other chemicals, these gaseous and liquid fuels compete with each other at many points. Natural gas is replacing heavy fuel and furnace oils as well as coal in adding approximately 50 per cent to its consumption since the close of the war. With a price index under 100, natural gas has no difficulty in replacing both solid and liquid fuels in many markets, including those remote from the oil country.

With this postwar transition now well established we are wondering if the time has not arrived when our economists should think in terms of the 67-gal. barrel or whatever it will be in the future and then split the total hydrocarbon markets among those who contribute the essential parts.

THIS WEEK

INDUSTRY DEVELOPMENTS—Import tax of $1 per barrel on foreign crude being urged on Congress. . . . ¶Biggest water-flood project in the Mid-Continent will be started at once in Burbank field. . . . ¶The Texas Co. opens complete new refinery on Delaware Bay and nears completion of important expansion of its Tulsa plant. . . . ¶Development of sweet-crude production in West Texas promises to overtake output of sour crude in that area. . . . ¶Nevada may be the next region to see an active oil exploration play. . . .

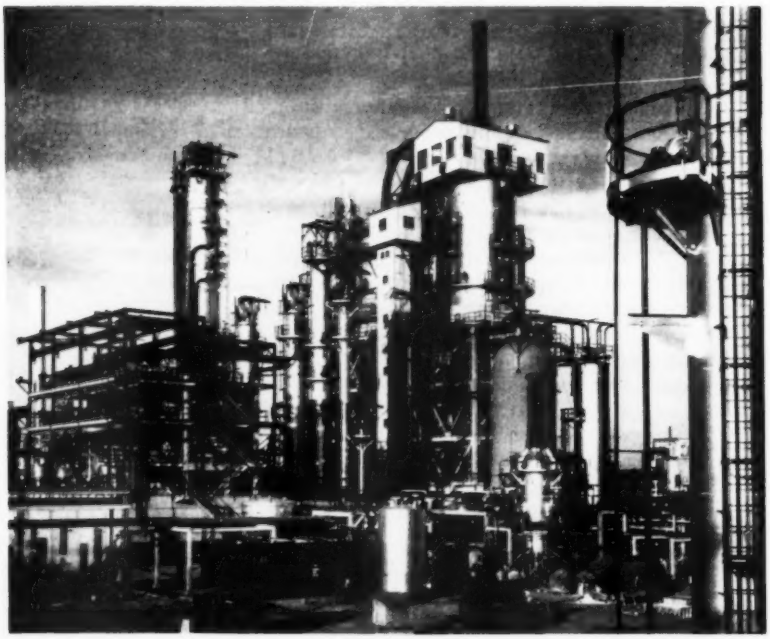
INTERNATIONAL—Mounting success of new deep-zone drilling at Japan's Yabase oil field closely watched by representatives of American, other foreign oil companies. . . . Output now amounts to 35 per cent of the whole country's oil production. . . . ¶Imperial Oil, Ltd., plans to borrow $50,000,000 to finance major expansion and development program. . . . ¶Mexican American Independent Oil Co. makes successful production tests at wildcat in southern Veracruz in the Isthmus region of Mexico. . . . Tests indicate 1,170 bbl. daily of light oil. . . . ¶French may ask ECA for grants to purchase petroleum coke and synthetic rubber in U. S. . . . ¶Motor-fuel rationing reintroduced throughout most of Australia. . . . ¶Two new companies formed to explore for and develop oil in Tunisia. . . . ¶Yeman says it's receptive to any possible further oil offers. . . .

TRENDS—Total demand averaged 5,996,000 bbl. daily for the first 9 months of this year, a decrease of 1.5 per cent from the same period last year. . . . Fourth-quarter demand through November 19 is estimated at about 6,070,000 bbl. daily. . . . More than 7,000,000 bbl. daily for the remainder of this year would be required to bring the 1949 average up to the record set in 1948. . . . ¶Cargo prices for gasoline on Gulf Coast are reduced. . . . Major supplier reduces gasoline prices on East Coast. . . . Heavy-fuel markets are firmer in Mid-Continent. . . .

PIPE LINES—FPC authorizes purchase and acquisition by Louisville Gas & Electric Co. of Louisville Transmission Corp. . . . Included is 66-mile transmission line. . . . ¶United Gas Pipe Line Co.'s proposal to build 105.6-mile, 20-in. loop in Louisiana approved by FPC presiding examiner. . . . ¶United Gas Pipe Line Co. awards contract for $1,000,000 gas-gathering project in Texas. . . . ¶Montana Power Co. will begin construction next spring on 83-mile natural-gas line from Butte to Bozeman. . . .

NATURAL GASOLINE—Construction is progressing at Cities Service Oil Co.'s new Chico, Tex., natural-gasoline plant. . . . ¶L.P. products show 7 per cent increase in first 9 months of 1949 over same period last year. . . . ¶Levelland, Tex., natural-gasoline plant begins operation. . . .

REFINING—British American Oil Co., Ltd., will build refinery at Edmonton next spring. . . . Plant will have an initial capacity of approximately 5,500 bbl. daily. . . . ¶New Houdriflow unit at Tide Water Associated Oil Co.'s Drumright, Okla., refinery nearing completion. . . . Will have a nominal capacity rating of 5,000 bbl. daily. . . . ¶Shell Development Co. announces plans to enlarge laboratories at Emeryville, Calif. . . . ¶Sinclair Refining Co. will hold fourth annual refinery symposium at Houston December 5. . . . ¶Graco Oil & Refining Co. changes its name to Sioux Oil Co. . . .



Now being tested and nearly ready for operation are these new units of the West Tulsa refinery of The Texas Co., pictured here in the final stages of construction. Heart of the addition is the new catalytic cracker, in the center of the picture. In addition to completing work on this plant, The Texas Co. this week opened its huge new complete refinery at Eagle Point, N. J. Both projects are described briefly in the news section of this issue

Biggest Water Flood

Phillips to begin North Burbank secondary-recovery project immediately on 1-year, pilot-plant basis

Kenneth B. Barnes

SHIDLER, Okla. — This small oil town in the center of the North Burbank oil field is now ready to become operating headquarters for the largest unit operation and largest water-flood project in the Mid-Continent area.

Already the U. S. Department of the Interior has transferred to the 14 corporations and 6 individual operators a blanket or unit lease for their former individual leases, and the unit operators have agreed to proceed with water-flooding development. *(See The Oil and Gas Journal, November 24, page 49).* The field has produced 169,000,000 bbl. of oil from 22,000 acres.

Phillips Petroleum Co. has been designated by the North Burbank participants as the unit operator, and Phillips will have its engineering and supervisory headquarters for this work centralized in a special building in Shidler.

The initial water flood will be installed at once on the 160 acres comprising the SW/4 16-26n-6e, which is in the center of the southern part of the field. Burbank has been drilled up on regular 10-acre oil-well spacing, so the drilling of nine water-injection wells on 660-ft. spacing between the present oil wells will constitute full development for the 160 acres except the outer edges of the former lease boundaries. Contracts for the drilling of the well for the pilot flood will be let at once. Average depth to the top of the Burbank sand (Pennsylvanian) is about 2,900 ft.; sand thickness mostly runs from 40 to a maximum of 100 ft.

One-year test.—Water-injection facilities will be constructed to provide for the injection of 5,500 bbl. per day of water to the initial or pilot flood. Operators will carry on the pilot 160-acre flood for a test period of probably 1 year to obtain actual performance data before expanding the development.

If performance of the pilot flood is successful — and Mid-Continent area petroleum engineers are practically unanimous in believing that North Burbank embraces this territory's largest and most promising water flood reserve—a large-scale operation is in sight over a long-time period. Operators will be faced with putting on about 1,000 acres of new water-flood development each year

Map of the North Burbank area

for 20 years, if the whole North Burbank unit is to be ultimately water flooded within the next 30 years. An active pattern-type flood of 1,000 acres itself is now without precedent in the Mid-Continent fields, and in itself is a major undertaking.

A substantial amount of detailed engineering, core analyses and long-range planning and research work already have been done preliminary to the field unitization and pilot water-flood program. It is believed that after large-scale water-drive operation gets under way, production from North Burbank may be increased to 20,000 bbl. per day or perhaps much higher, as contrasted to the present yield of 4,000 bbl. The present production itself largely has been possible only through fieldwise gas repressuring, originally started in effective manner back in 1933. *(See detailed article in The Oil and Gas Journal, November 25, 1944, pp. 62-66).*

Refinery Completed

TULSA. — Test operations on The Texas Co.'s new 30,000-bbl.-per-day vacuum pipe still, recently erected at its West Tulsa refinery, are now essentially completed. Within the next few weeks all facilities included in the modernization program for the refinery are scheduled to start on regular operations.

Other major units in the modernization and expansion program are now being tied in with the plant's new operating scheme. These include a fluid catalytic cracking unit with a nominal capacity rating of 15,000 bbl. per day of fresh feed, a catalytic polymerization unit designed to produce 1,500 bbl. per day, and facilities for giving furfural treatment to 2,500 bbl. of middle distillates daily.

Approximately 900,000 bbl. of new storage has been added to meet the demands of the new operations. Supplemental facilities include a new steam-generating plant and water-handling equipment.

The major engineering-construction contractors for the project are Foster Wheel Corp., M. W. Kellogg Co., and Dravo Corp. Foster Wheeler erected the vacuum pipe still and the furfural unit, and participated in the construction of the steam-generating plant. Both catalytic processes, the cracker and the poly plant, were installed by Kellogg. Dravo built a large part of the steam plant. Universal Oil Products Co. engineered processing for the catalytic poly unit.

Porter Reelected

TULSA. — Frank M. Porter, president of Fain-Porter Drilling Co., Oklahoma City, was reelected president of the Mid-Continent Oil and Gas Association at the annual meeting of the directors here November 28.

The all-day meeting was devoted to reports from the president on national problems and from the executive vice presidents on details of the departments under their supervision, including such problems as taxation, percentage depletion allowance, and tidelands, on which the association has been active during the year.

Other officers of the general association reelected were: Clarel B. Mapes, Tulsa, secretary-treasurer; J. L. Hamon, Cox & Hamon, Dallas, first vice president; William T. Payne, Big Chief Drilling Co., Oklahoma City, vice president for Oklahoma; H. E. Zoller, Derby Oil Co., Wichita, vice president for Kansas; R. B. Anderson, W. T. Waggoner Estate, Vernon, vice president for Texas; A. H. Weyland, Arkansas-Louisiana Gas Co., Shreveport, vice president for Louisiana; C. H. Murphy, Jr., C. H. Murphy Co., El Dorado, vice president for Arkansas; James P. Evans, Jr., independent operator, Jackson, vice president for Mississippi; James L. Duffy, J. L. Duffy Co., Grove Hill, vice president for Alabama.

Election of a vice president for New Mexico was deferred to a later date.

The Kansas-Oklahoma Division of the association held its annual membership meeting here November 29,

and heard special reports on the prospective legislative situation in the two states from Gerald Gordon, secretary-manager of the Associated Industries of Kansas, Topeka, and L. D. Melton, director of the Oklahoma State Legislative Council, Oklahoma City.

A feature address was by Conger Reynolds, director of public relations of Standard Oil Co. (Ind.) Chicago, who described the reasons behind the public-relations program of the Oil Industry Information Committee, of which he was chairman last year.

"The United States has the creeps —it is creeping into socialism whether the people want it or not," Reynolds said. "The O.I.I.C. was set up in 1946 to face the growing encroachment of statism."

Officers of the Kansas-Oklahoma Division reelected were: William T. Payne, Big Chief Drilling Co., Oklahoma City, president; Clarel B. Mapes, Tulsa, secretary-treasurer; H. E. Zoller, Wichita, vice president for western Kansas; Carl Weiner, Chanute, vice president for eastern Kansas; A. W. Ambrose, Cities Service Oil Co., Bartlesville, vice president for northern Oklahoma; Lloyd Noble, Noble Drilling Co., Ardmore, vice president for southern Oklahoma; W. R. Wallace, Oklahoma City, vice president for western Oklahoma.

Villard Martin, independent Tulsa oil producer and attorney for several oil interests, was elected first vice president, succeeding the late Lloyd Owen of Tulsa.

Olsen Company Sold

OKLAHOMA CITY.—R. Olsen Oil Co., with headquarters here, has been purchased jointly by Deardorf Oil Corp., Oklahoma City, and Graham-Paige Motors Corp., New York. There will be no change in corporate name or personnel, and R. Olsen will continue as president.

The Olsen company owns leases in Texas, New Mexico, and Oklahoma totaling approximately 21,000 acres, proven and semiproven, with 140 gross producing oil and gas wells, and estimates its net ultimate recovery from these properties at 16,000,000 bbl. of crude and distillate and 210 billion cubic feet of natural gas. The purchasers announced that the Olsen company will embark on an aggressive drilling and exploration program to bring its proven locations to the stage of maximum development.

Several thousand acres of the Olsen leases are in the Permian basin in Lea County, New Mexico, starting at the Texas line and extending on the general high to Eunice. A number of these leases have been developed to various depths for both oil and gas, with others offering possibilities for production in deeper horizons, including the Ellenberger, discovered in recent years in this general trend.

SOUTHWEST

Sweet-Crude Invasion

Pre-Permian pays now producing nearly a third of total output in a traditionally sour-crude area

D. H. Stormont

MIDLAND, Tex. — West Texas can no longer be considered just a sour-crude area.

Development of pre-Permian reservoirs has reached the point where these sweet-crude fields produce almost one-third of the area's total output.

Furthermore, with more than two-thirds of the current drilling activity being directed toward these stratigraphically deeper pays, the proportion should continue to increase.

Nine-year growth. — In 1940, which was about the time the search for pre-Permian pays was begun on an extensive scale, the area's annual yield of these crudes amounted to only 2,360,000 bbl.—less than 3 per cent of West Texas' total output of 83,345,000 bbl.—and practically all of it came from the deep Ordovician pay of the Big Lake field. Devonian and Silurian oil production had not yet been established and Pennsylvanian production from the new Page field amounted to less than 15,000 bbl. for the year.

The wide-spread search conducted through the war years resulted in the discovery of many new pre-Permian reservoirs so that during 1947 the percentage of West Texas crudes from these reservoirs amounted to about 23 per cent of the area's total. Continued exploration and development has resulted in increasing the figure to about 31 per cent, according to Railroad Commission production summary for last August. At that time total monthly output amounted to 17,459,000 bbl. of which 5,576,000 bbl. were from pre-Permian pays.

Scurry County's Pennsylvanian limestone reef fields are accounting for much of the area's recent increase in pre-Permian crude production. During August the four fields, North Snyder, Kelly, Diamond-M and Sharon Ridge (Canyon), had a total output of 581,382 bbl. If the first three fields prove to be producing from a single reef mass, as now appears to be the case, this will become West Texas' largest pre-Permian reservoir.

Area has 200 wells.—By the latter part of November over 200 oil producers had been completed in the four limestone-reef fields. Within their proved limits some 110 rotaries were at work while an additional 25 rigs were engaged in wildcat and stepout operations. Most of the rigs were concentrated in the North Snyder area. Activity along the reef "backbone," which apparently extends south and southwest through the Kelly area to Diamond-M, however, is constantly increasing.

As this would indicate, these Scurry reef fields account for almost one-half of West Texas' pre-Permian drilling activity, and more than a fourth of the total operations. Of the 434 rotary rigs in operation late in November, about 304 were scheduled to test pre-Permian pays. Only some 131 rigs were engaged in developing the shallower Permian pay zones.

Gas-Storage Plan Approved

BRECKENRIDGE, Tex.—Lone Star Gas Co. has been granted permission by the Railroad Commission to conduct gas storage operations in a Strawn sand reservoir of an old Stephens County field. Casinghead gas gathered from oil fields served by Lone Star in Stephens and Eastland counties will be stored in the underground reservoir during summer months and then withdrawn during winter to assist in meeting heavy demands.

According to evidence submitted at the hearing the 2,000-ft. Strawn sand was discovered in 1929 and there are seven wells completed in the reservoir. The original bottom-hole pressure was about 900 psi. and the present pressure is about 155 psi. Location of the proposed project is south of Breckenridge, in portions of the T.P. R.R. Co.'s Block 7 Survey and S.P. R.R. Co.'s Block C Survey, Stephens County.

MER Cuts Opposed

Considerable opposition is developing to reductions in the maximum efficient rates of production of Texas fields, now the subject of a series of hearings before the Texas Railroad Commission.

At the hearing on Foster field, Ector County, operators were asked to show cause why the MER should not be reduced to 15,500 bbl. per day from its present 25,000 bbl., but they argued that this would cause waste by cutting production of the most efficient wells and would increase the gas-oil ratio.

Similar opposition arose at the hearing on McElroy field, Crane and Upton counties, where the commission proposed a reduction in the MER from 35,000 to 25,000 bbl. Operators contended that 32,000 bbl. is the proper figure, declaring that this field has no gas caps and operates solely on a solution-gas drive. They testified that the average of pressure decline during the 23-year life of the field has been 3 per cent per year, even though it has been 6 per cent during the last 3 years.

Gas Study

BATON ROUGE.—Final meeting of the Louisiana legislative committee appointed at the 1948 session to investigate the laws controlling natural gas conservation is scheduled for this city early in December.

Some observers feel that about the only recommendation that will be made is the passage of a law prescribing standard gas measurement. The Louisiana legislature is scheduled to meet next May and the committee will report at that time.

Safety Device

SHREVEPORT. — A mechanical device to stop the flow of oil and gas from a well when there is a break in the line has been developed by L. C. Clair, electrician at the gasoline plant of Hunt Oil Co. near Lisbon, La.

It is an automatic safety-flow nipple, to be installed on the christmas tree of each well. The inventor, pictured here with one of his new nipples, claims his device is simpler and less costly to manufacture than other means now used to a limited extent to accomplish the same purpose.

The nipple is contained in an individual housing and consists of only four working parts — valve, seat, stem, and spring. Installation can be done by lease crews and no adjustments need be made for any range of flow or for pressure correction.

Clair has several other inventions to his credit, and developed this at the request of an oil producer who incurred a heavy loss as the result of a break in a lease line.

The device is said to make use of reverse flow, as flow is essential for holding it open during operation and for closing it in case of a break.

Propane Storage

Practicability proven by Carthage field project

CARTHAGE, Tex. — The feasibility of underground storage of propane is considered proven as the result of back-flow tests in the Carthage field project of The Chicago Corp.

In testing operations, the company flowed back from the reservoir about 3,000 bbl. of propane. The recovered product was tested and found to be free of salt-water contamination and, therefore, salable directly as it came from the well.

The project was started last summer when an injection well was drilled near the company's gas-processing plant on the western edge of Carthage field. The well was completed in a 3,000-ft. water-bearing sand lens of the Paluxy zone, near the crest of a slight structural nosing in the formation.

After a limited volume of propane had been injected into the formation, pushing the salt water back from the well bore, injection pressures required became so high that there was danger of rupturing the formation. A relief well then was drilled downstructure so that salt water could be bled from the reservoir as the propane was injected in the upstructure well.

Prime reason for the project is to provide storage for propane during summer months when demand is slack. Then during winter months it can be withdrawn as needed in much the same manner as gas distributors do their summer surplus. To sell the product at the much more profitable winter price would require storage for the day-to-day production, and above-ground storage for 100,000 bbl. of propane would be economically prohibitive.

If sold to enrich natural gas during the summer months the propane would bring 15 cents per barrel or less, since converted to a gas it is equivalent only to about 1,500 cu. ft. Sold during the winter when L.P.G. demand is heavy, it brings about $2.50 per barrel.

Secondary Recovery

AUSTIN. — Four secondary-recovery projects for the state have been approved and hearings set on applications for three others by Texas Railroad Commission.

Bell Oil & Gas Co. has been granted approval to water flood its Cropper "A" and "B" and Cropper-Ashton leases, Wichita County Regular field, Wichita County. The Texas Co. has been authorized to water flood its N. B. Chenault lease, Burkburnett area, also in the Wichita County Regular field. In the Pecos Valley HG field, Pecos County, Sawnie Robertson received permission to water flood the Yates sand reservoir. Coffield & Guthrie, Inc., received authority for a water-flood operation in certain leases of the Corsicana Shallow field, Navarro County.

On December 9, the commission will hear the application of the Bridwell Oil Co. to carry on a repressuring project in the North Chalk Hill field, Archer County. On December 13, a hearing will be held on the application of Fred M. Manning, Inc., to repressure in the Manning-Harrington area, Throckmorton County Regular field, Throckmorton County. Warren Oil Corp. will be heard December 16 on its application to water flood certain leases in Jack County Regular field, Jack County, Texas.

Panhandle Gas Price

AUSTIN.—The Railroad Commission last week issued a new natural-gas price order for Panhandle field. The order establishes a weighted average market price for sweet gas for light and fuel purposes at 4.3674 cents per 1,000 cu. ft., and that for sour gas at 3.8674 cents, both based on 16.4-psi. pressure. The hearing and finding resulted from a bill passed by the Fiftieth legislature providing that Panhandle natural gas may be used for carbon black if it is bought at the prevailing price set in the Panhandle field.

Heavy Oil-Import Tax

Congress may be asked to impose $1 per barrel duty on foreign crude oil when it convenes in January

Bertram F. Linz

WASHINGTON.—An import tax of $1 per barrel on crude and products may be urged upon Congress in January as a step toward stemming the flow of foreign oil into the United States.

The idea of a $1 tax has been offered by a group of Texas congressmen who last session made an unsuccessful fight to secure adoption of a quota system to control oil imports.

A tentative bill has been written by Rep. Ed Gossett, one of the leaders in the fight, for introduction next year. In the light of disclosures at the New York hearings of the House small-business subcommittee last month that imports may top 845,000 bbl. daily in the first quarter of next year, it is expected to receive strong support from members from all of the producing states.

Has good chance.—Industry representatives in Washington feel there is a good chance that the administration might accept an import-tax increase. They point out that it would increase revenues, which would be helpful, and might be acceptable to the State Department which, while expressing sympathy toward the domestic procedures, has been unwilling to consider a quota arrangement in view of the administration's effort to eliminate quotas and other barriers to international trade.

Proponents of the idea also believe it would make effective the national oil policy enunciated by the National Petroleum Council that imports should supplement but not supplant domestic production.

A $1 tax, they contend, would reduce imports to whatever volume actually was necessary to insure an adequate supply of oil to consumers. Domestic producers are said to believe the proper level of imports is between 300,000 and 400,000 bbl. daily, which at the proposed tax would provide a revenue of $100,000,000 to $150,000,000 a year.

Commenting on the companies' testimony at the New York hearings in a report to President J. Ed Warren, Russell B. Brown, general counsel of the Independent Petroleum Association of America, declared the import program has became rigid with little or no flexibility to permit adjustments to changing conditions.

Policy "nebulous."—"Company investments, company interests, company expansion programs and the economic and political pressures in foreign countries, according to the testimony, are the determining factor in how much oil will be brought into this country," Brown said.

"The industry policy of 'supplementing' domestic production has become nebulous and meaningless as far as current or foreseeable import plans are concerned. Contracts have been made, extending over a period of years, for the importation of petroleum into the United States. Capital has been invested in foreign areas to be recovered by such importation. Apart and distinct from any 'need' for imports, the output from foreign areas much be maintained to satisfy the demands of foreign governments and protect the competitive position of a few companies in the world market."

Brown said the company spokesmen told the subcommittee that imports have not injured domestic producers and will not do so in the future, but pointed out that even as they were testifying the Texas Railroad Commission announced a 218,000 bbl. daily reduction in allowables and the Rock Island refinery at Duncan, Okla., was shut down.

"The industry now has a statement of the real views of the importing companies sufficiently complete to afford a solid, factual basis on which to prepare for the future," Brown told Warren.

Controls sought.—"The actions and statements for those importers, who have announced this continued threat to the American industry through imports, remove all hope of solution within the industry and all doubt as to the need of governmental action," he declared.

Returning from the New York hearings, the subcommittee staff had comment of much the same tenor, saying that the testimony showed that the export trend is downward and imports are on the upgrade.

Oil-Tax Receipts Up

WASHINGTON.—Treasury receipts for the three oil taxes during the first 10 months of this year were approximately $12,000,000 greater than for the corresponding period in 1948, it was announced over the week-end by the Internal Revenue Bureau.

More than $7,000,000 of the increase was piled up in the first 4 months of the Government's fiscal year, which begins July 1, it was shown.

For the 10-month period, the bureau reported gasoline tax collections of $414,111,588 against $401,976,791 a year ago; $69,244,679 from lubricating oils against $68,679,045 and $15,454,549 from pipe-line transportation against $15,987,714.

The bureau announced that October collections included $7,163,260 from lubricating oils against $6,289,819 for the same month in 1948, $49,320,824 from gasoline against $45,803,408, and $1,286,669 from pipe-line transportation against $2,004,080.

Crude for Japan

Bids asked on 960,000 bbl. of oil to meet shortage

WASHINGTON.—The Armed Services Petroleum Purchasing Agency will send out invitations this week for tenders of 960,000 bbl. of crude oil for Japanese refineries.

This is the first time the agency has ever gone into the crude market in a big way, and for this reason officials decided to buy the oil on the basis of sealed bids rather than attempt to negotiate contracts, hoping thereby to interest suppliers generally.

ASPPA officials asked that anyone in a position to furnish the oil and interested in so doing get in touch with the agency in Washington.

An interim measure.—The military were asked to purchase the oil for Japan because of delays in contracting for 4,005,000 bbl. of crude by the Japanese Ministry of International Trade and Industry. That oil was to be bought with sterling, and while it has been reported in Washington that satisfactory offers had been received, they were contingent upon permission from the Bank of England for the use of the sterling by the supplying companies, which permission does not appear yet to have been granted.

As a result of this situation, Japan is facing a shortage of oil, and the 960,000 bbl. purchase will be an interim measure to keep supplies moving. This oil will be purchased for dollars, with the consent of the SCAP.

The specifications for the crude to be purchased by the ASPPA will be rather general, it was said. The Japanese want a crude which will give a minimum of 23 per cent of 350° endpoint gasoline of 65 octane rating with a maximum of 3 cc. of lead, and 17 per cent lube-oil yield. The crude

is to have a maximum of 1.5 per cent sulfur over-all with no single cargo to exceed 1.6 per cent. The gravity called for will be between 31° and 38°.

Other purchases seen. — While officials here had no direct information regarding the situation in Japan, there were indications that this purchase may be followed by others if difficulties continue to impede the consummation of the 4,000,000-bbl. deal.

They are, accordingly, eager to secure as much competition as possible for the business and are adopting the bid procedure to see whether tenders will be made by companies on the West Coast and in Venezuela.

Foreign-Aid Jitters

WASHINGTON.—Definite fears that the U. S. Government would be the real investor under President Truman's "Point 4" program to provide guarantees on American investments abroad were voiced last month at a meeting of the Inter-American Conference.

A six-man panel which led the discussion split sharply on the question, with two members, one of them Gordon H. Michler, foreign government relations executive of Standard Oil Co. (N. J.), expressing doubts as to where industry would wind up under the program.

The opposite position was taken by Hawthorne Arey, vice president of the Export-Import Bank, the agency which would administer the program.

That there is some question as to the role of the Government under the "Point 4" program, however, was demonstrated at the recent meeting of the board of directors of the U. S. Chamber of Commerce, which adopted a resolution calling on Congress to so frame the proposed law as to define precisely the powers of the guaranty agencies, limit the total of obligations, and extend the protection to existing investments when essential to avoid harmful discrimination.

The Inter-American Council of Commerce and Production is a subsidiary of the national chamber.

The meeting also discussed the Latin American investment situation, and speakers agreed that the condition surrounding operations by the United States interests must be improved before additional American funds can be expected to be invested.

O.W.I.U. Eyes Pensions

The Oil Workers International Union (C.I.O.) may launch a drive for a union voice in the administration of pension plans, it is indicated in the latest issue of its paper, the Oil Worker.

Discussing the trend toward pension plans in other industries, the article

WATCHING WASHINGTON

Bertram F. Linz

Bureaucrat's Heaven

Uncle Sam goes a long way to maintain the prestige of his representatives abroad, and particularly in the Far East where Occidentals "lost face" in the first flush of Japan's wartime successes.

Don Carroll, formerly with the Oil and Gas Division and now straightening out the petroleum-supply difficulties of Korea for the authorities, reports that Washington was never like this.

Carroll has a house in a compound—with a private police force which maintains a round-the-clock watch. He also has a cook, gardener, house servants, and a personal attendant for each member of his family. The cost, he says, is nothing but cigaret money. The police, incidentally, are neither to keep him in line nor protect him from attack, but to keep curious natives from getting underfoot.

Carroll's first big problem was the elimination of a black market in oil. His second important undertaking will be to regularize a system of distribution. It was over this that occupation authorities and two Korean Government departments quarreled, each contending it was best equipped to supervise marketing. The American companies supplying the oil also wanted to handle distribution, and it is probable that any system set up will be administered by Americans rather than natives, for a time at least.

The New Competition

A new definition of monopoly—one which indicates that the oil industry is far from monopolistic—has been presented to the Celler committee of the House.

In its investigations of the subject the committee has been dissatisfied with the dictionary definition: exclusive control of the supply of any commodity in a given market. It has toyed with others, such as the financial size of a company, or its enjoyment of an arbitrary percentage of the market.

Herman W. Steinkraus, president of the Chamber of Commerce of the United States, told the committee that a monopoly is a company so free from competitive pressure that it has no interest in new and better processes and products; shows no disposition to work for lower costs and selling prices; can maintain profits without fighting to maintain volume; and does not bring unused capacity into use whenever sales revenues can be increased enough to cover the cost of doing so.

Steinkraus also gave the subcommittee something new to think about with respect to competition. Competition, he said, is not just fighting for business with another company in the same industry, but the actual possibility of losing business to somebody else, whether that somebody else is in your own industry or not.

Textiles are an outstanding example of the new competition, but synthetic rubber is another. Closer home in the oil industry, esterlubes can replace petroleum lubricants for low-temperature work, and certainly synthetic liquid fuels from shale, coal, and gas will fight for position with petroleum products in the not-too-distant future.

In fact, synthetics and substitutes may deal more drastically than the antitrust laws with any monopolies that may exist.

Yemen May Be Next

The current visit to this country of the Shah of Iran may be the precursor of similar trips by other Middle East rulers seeking military and economic aid from the United States, in some of which oil may figure prominently.

There may be some significance, in this respect, in recent reports from Cairo that Yemen, the largest area which had not yet been explored for oil, is adopting an "open door" policy and inviting discussions with oil companies looking to the granting of concessions.

The young Shah of Iran didn't discuss oil concessions while in Washington for the simple reason that in order to keep the Russians out of the country Iran was forced 2 years ago to nationalize its petroleum. Yemen is down on the southern tip of of the Arabian Peninsula, well away from the soviets.

All of the Arab countries, however, are apprehensive of Russian designs and anxious to bolster their defensive position. Since they have nothing but oil to offer in return for aid, petroleum may be an important subject of discussion in any negotiations for American military and economic assistance.

admits that the pension question in the oil industry is more complicated than in the steel, auto, and rubber industries, and says:

"Many oil companies already have pension plans—unsatisfactory plans, but plans nonetheless. Some of these plans are paid for by the companies, but most of them are jointly paid for by company and employe. In very few of the oil-company pension plans does the employe have a vested right to draw out his share of the fund should he quit the company or be discharged. In very few do the employes or their union have a word in administering details of the pensions.

"Oil-industry pensions vary greatly in size. A few companies now have plans that pay more than the new $100 minimum established by steel, auto, and rubber industries. Others pay niggardly amounts and still others have no pensions at all. All these things are problems to be worked out by O.W.I.U. in its current drive for pensions. These problems were recognized by the national policy committee, which met last May while the pension fight was still a new thing.

"Since that time, slow but definite progress has been made toward improving oil-industry pensions. Of particular significance is the fact that Sinclair Co., which employs more O.W.I.U. members than any other one company, has agreed to bargain on the pension question and negotiations were scheduled to begin November 28."

WEST COAST

Nevada Oil Search

Serious exploratory campaign to continue next year. At least one wildcat planned

Robert Harwick

LOS ANGELES.—Favorable reports on the oil potentialities of Nevada from time to time have brought remarks of "overoptimistic" and "premature" from major companies interested in the area.

But these same companies now are investing large sums in exploratory work, and at least one wildcat is scheduled for next summer.

Continental Oil Co. has been most active in the area, where serious exploratory work has been under way for the past 2 years. Other companies involved include Phillips Petroleum Co., Union Oil Co., Standard Oil Co. of California, and General Petroleum Corp.

The area under consideration involves broadly the eastern portions of the state, with some areas extending into Utah. Of greatest interest is White Pine County, in which one fairly large anticline has been mapped near Eureka.

This particular area first was brought into prominence through the work of Charles Lavington, a well-known Denver geologist. Phillips took a lease in the area, later subleasing to Benjamin Siegel, at that time owner of the Flamingo Club in Las Vegas. Under the agreement Siegel was to have drilled a test last summer. No work was done, and Phillips and the Siegel estate have extended the agreement with a test planned for next summer.

The Phillips-Siegel agreement called for drilling to 4,000 ft., but present reports on the anticline near Eureka indicate that a more likely depth would be 8,000 to 8,500 ft.

About 1,000,000 acres now are under lease in Nevada. More than 80 per cent of the land is open public domain. Leases are granted on specific sections for 5 years on a one-eighth royalty basis. The fee is 50 cents an acre for the first year, with no fee in the second and third years, and a 25-cent fee in the fourth and fifth. No actual drilling is required.

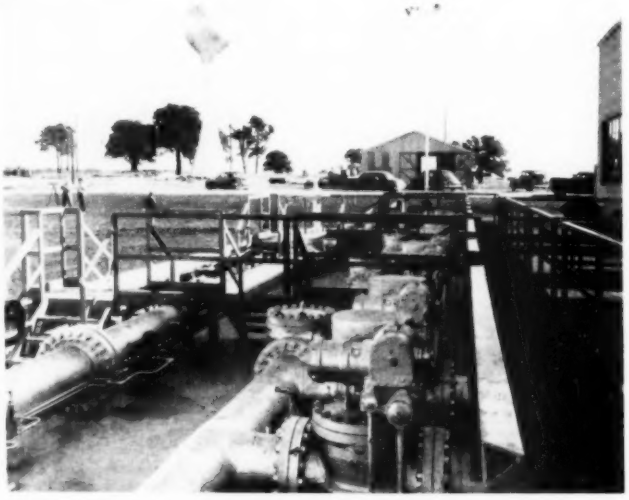
Continental, Standard of California, and Union all hold leases of this type. General Petroleum at present has no land under lease.

While the state has received some wildcatting attention in the past, results have not been encouraging. All attempts have been made by companies requiring public sale of stock for financing the hole.

In the early 40's two bore holes were put down near Arden, some 12 miles southwest of Las Vegas. The holes went just beyond 2,000 ft. but without show. In 1948 a test was drilled at Sloan, about 18 miles southwest of Las Vegas. This test reached 1,500 ft. and reported traces of oil around 1,350 ft. The deepest test on record in Nevada reached 2,845 ft. The site of this test is in Churchill County, 9 miles south of Fallon.

The areas under consideration have many outcroppings of carbonaceous shale. One small seep in a spring is also on record. Production, if it is obtained, will most likely be found in Mississippian and Pennsylvanian limestone. It is known that these formations have sufficient porosity to serve as petroleum reservoirs.

Work is now at a standstill in Nevada. With the end of winter, all the interested companies plan to return to this area for further exploration work.



MARS-LIKE OBJECT in the left background is just a water tank at the Chelsea, Okla., pump station serving the Ozark Pipe Line System 22-in. crude-oil line between Cushing, Okla., and Wood River, Ill. In the foreground is the manifold, showing the remote-controlled, motor-operated valves. The system is owned by Shell Pipe Line Corp. and Texas Pipe Line Co.

Quake Damage

Companies think 120 wells may have to be redrilled

LOS ANGELES.—The tremor that jiggled Long Beach the night of November 17 didn't seem like much of a quake. The seismograph recorded it, but there was no surface damage. Most people in Long Beach didn't even notice it.

But the next morning 55 wells in the Long Beach Oil Development Co. area of Wilmington field, had gone off the pump with jammed sucker rods. In the days following more wells went off. Last week the total had reached 86.

Of these, 61 were Long Beach Oil Development Co. wells and 25 belonged to Union Pacific Railroad. The number of wells that may require redrilling might reach 120, as all wells within the area of damage are suspect.

The area of damage is the same area that has had slippage over a period of several years. Previous slippage was most pronounced at depths centering at 1,630 ft., in what is termed the "JF" line.

Strangely enough, the damage following the quake occurred at the "K" line around 1,700 ft. This zone had shown some slippage in previous tests, but it had caused little damage to casing.

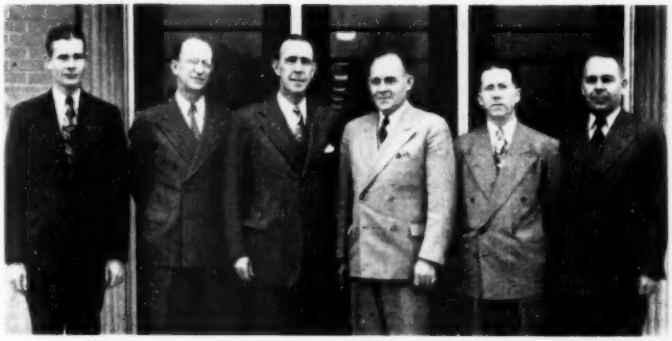
The movement apparently has been about 1 ft. All casing, with the exception of that in redrilled wells protected by a 30-in. reamed "bell," was damaged. This includes those wells where the casing had been reinforced with a sleeve because of previous movement.

Little can be salvaged from the damaged wells. To put them back on production will require redrilling from the surface. The cost of this operation has been estimated at $55,000 per well, plus the loss of around 3,500 bbl. per day from the Long Beach property and 2,000 bbl. daily from the U. P. property. However, some of this can be made up by producing wells that have been shut in in an effort to determine effect of lower production on subsidence.

Unfortunately for the efforts of the City of Long Beach and oil producers, the quake came just before the quarterly subsidence check. This check now shows additional subsidence near the geographic center of subsidence of two-tenths of a foot. Other areas show a rise in land level of one-tenth of a foot. How much of this change is the result of the quake and how much is the result of subsidence is now a moot question.

With the quake occurring when it did, it is almost impossible to make a measure of cause and effect in subsidence control efforts.

GREAT LAKES-EASTERN



These are the key men who will assist A. M. Martin, superintendent, in the administration and operation of The Texas Co.'s new Eagle Point refinery: R. W. Sanders, chief chemist, formerly with Beacon Research Laboratories; H. P. Creel, assistant superintendent in charge of engineering, maintenance, and construction, formerly chief engineer on company construction projects at Los Angeles, Casper, and Lockport; P. N. Hunt, power engineer, formerly engineer at several company refineries; R. B. Johnson, supervisor of industrial relations, formerly in the managerial division of the New York office; M. D. Dennis, chief clerk, formerly special accountant in the New York office; and W. G. Copeland, assistant superintendent in charge of operations, formerly superintendent of Casper and Sunburst refineries

Refinery Opened

Texas Co. celebrates end of biggest postwar project

George Weber

WESTVILLE, N. J.—Completion of the largest single refinery construction project in this country since the war was marked November 29 with ceremonies formally opening The Texas Co.'s Eagle Point works near here.

The new refinery, a complete unit with a capacity of 40,000 bbl. per day, was constructed in one operation, in contrast with most refineries which develop in a series of stages. Located on Delaware Bay, south of Philadelphia, it is designed specifically to process either foreign or domestic crude, and is particularly adapted to handle high-sulfur crudes.

A. M. MARTIN

Aside from two small asphalt plants, it is the first refinery of The Texas Co. on the Atlantic Seaboard, and this fact reflects a general trend toward an increase in refining capacity in eastern centers of high consumption.

Superintendent of the Eagle Point refinery is A. M. Martin, who has been supervising its construction for the past 2 years. Martin is a veteran with The Texas Co., having operated plants and supervised refinery construction for the company in many locations. He was in charge of the company's war-time expansion program, and in 1944 was elected vice president of Arabian American Oil Co., from which post he was recalled to direct planning and construction of the Eagle Point plant.

To run the new plant the company has transferred key operating men from a number of its other activities, and has been conducting an intensive training program for new employes, a majority of whom have been hired locally.

The Eagle Point plant is so situated that it may be expanded by the addition of new units in the future, and ultimately it may have a capacity of 200,000 bbl. or more.

The process section includes atmospheric and vacuum crude-distillation units with designed capacity for 40,000 bbl. of crude per stream day, and a fluid catalytic cracking unit. Facilities for gas recovery, polymerization, reforming, solvent refining, and

treating complete the major process units.

Virginia Development

CLIFTON FORGE, Va.—A contract for exploration and development of oil and gas on a tract of 70,000 acres in western Virginia has been obtained by Ward Delaney, a Charlottesville operator, from A. H. Grimsley, retired utility executive of Clifton Forge, owner of the mineral rights under the Douthat Survey.

The tract lies in Allegheny and Bath counties, close to the West Virginia line, and stretches from Clifton Forge and Covington on the south to Burnsville on the north. It lies in the Appalachian Valley, midway between the producing area of Lee, Wise, and Scott counties in the southwest tip of the state, and small gas production in Rockingham County in the north.

The Douthat lands are said to be geologically favorable. Oil and gas seeps have been known for some time.

There is considerable development work in areas to the south. The California Co. is drilling a well at Price's Mountain, Montgomery County, which is below 8,000 ft. and still drilling. Information on its findings is being withheld by the company. In Scott County, Clinchfield Coal Co. has begun a drilling program and has brought in a gas well rated at 17,000,000 cu. ft. per day. United Carbon Co., Charleston, W. Va., has taken large contracts in this same area and contemplates a drilling campaign.

Ashland, Aetna Merge

ASHLAND, Ky.—Ashland Oil & Refining Co. of this city and Aetna Oil Co. of Louisville have announced a merger through exchange of stock, subject to approval of the stockholders of the two companies.

The plan involves no changes in personnel, and Aetna will continue the sale of products under its present brands. Important additions are planned for the Aetna refinery at Louisville, which now has a crude-charging capacity of 8,000 bbl. per day and thermal cracking capacity of 4,600 bbl.

Aetna now markets petroleum products in Kentucky and southern Indiana through 39 bulk plants and more than 200 service stations, and has a terminal at Cincinnati and a fleet of 14 river barges. Ashland, has not operated in Louisville, but has a 41,000-bbl. refinery at Ashland, including catalytic cracking with capacity of 8,500 bbl. per day, plus an extensive system of river barges and terminals. Last year Ashland merged with Allied Oil Co. of Cleveland, thus acquiring a 12,000 bbl. refinery at Canton and extensive marketing facilities throughout Ohio.

ALONG THE GULF

Leigh S. McCaslin, Jr.

Refiner's Problems

HOUSTON.—Independent refiners, as everyone knows, have been having a pretty tough time of it for some months. A Gulf Coast independent unburdened some of his troubles this week to the Journal's Houston office. He described two problems as being the most pressing from the standpoint of the independent refiner.

On the first problem, he had this to say: "It is certainly past time for the oil industry to take inventory and quit blaming the weather for any or all of its trouble. It was rather refreshing to attend a state-wide hearing in Austin and listen to one after the other attribute the reason for their inability to take more crude to the fact that the market for products did not justify. Personally, I feel very much encouraged, and once the entire industry realizes the demand for crude oil is a demand for the products produced from crude oil and the production of both is kept within the limits of market demand we will have a much healthier industry."

Discussing the second major problem, the independent said: "In addition to the industry as a whole suffering from a production of finished products in excess of market demand, I think the refining segment of the industry has another problem in trying to operate under two sets of rules. By this I mean that the refiner of liquid petroleum, or crude oil, is paying a fixed posted price for his raw material, and trying to compete with another segment of the industry, namely recycling plants which are manufacturing a portion of the products from petroleum that the refiner of the liquid petroleum is manufacturing. And the recycling-plant owner is manufacturing such products with no fixed price for his raw materials, but rather a practically guaranteed profit with the price he is paying for raw material based on the price he gets for the finished product."

Shades of the Old West

Charley Simons, vice president and general manager of the Texas Mid-Continent Oil and Gas Association, has warned Texas operators to "be alert to renewed activity on the part of oil-field thieves." The association is expecting spot shortages of oil-field equipment caused by the coal and steel strikes to encourage looters.

A staff of special investigators, headed by John W. Kelley, is maintained by the Texas Mid-Continent group to fight oil-field "rustling." Kelley was chief of police during the boom days of Breckenridge, Tex. Since he joined the association in 1937 he and his staff have helped convict more than 250 equipment thieves.

Offshore Research

Indicative of the great interest in offshore oil is the fact that 500 references are contained in the bibliography on "Offshore Petroleum Developments" just released by Southwest Research Institute.

The biblography is the first publication of the institute's recently organized division of oceanography and meteorology which is under direction of Dr. Emory N. Kemler in Houston. In announcing the booklet, Kemler stated the twofold objective of the division as (1) to develop fundamental scientific knowledge regarding the Gulf of Mexico, about which little is known, and (2) to provide a facility—trained staff, instruments, vessels, and laboratories—available on a contract basis to industry and governmental agencies to conduct research on specific problems.

Similar studies to those planned by the division are being carried on in both the Atlantic and Pacific Oceans (Woods Hole Oceanographic Institute in the Atlantic and Scripps Oceanographic Institute in the Pacific).

Alabama Perks Up

Alabama's little oil industry is quite excited over a new strike in Gilbertown, Choctaw County, its only producing field. The well, Houser Drilling Co. 1 C. B. Morgan, has been tested for a daily rate of 528 bbl., but field regulations limit its production to 100 bbl. daily.

"It looks like the best well in Alabama," said Walter B. Jones, state oil supervisor. "It is of great interest to us because it appears to extend the area of East Gilbertown field or indicates that the Gilbertown fault swerves eastward instead of southward, as we had heretofore believed."

Such a well would be routine news in an active play, but development has been very slow in Alabama for several years because of the low gravity of the oil and the small amount of proven acreage remaining in the Gilbertown area.

GULF COAST

Export Tax Proposed

MERIDIAN, Miss.—An export tax on crude oil was proposed here last week by Clarence E. Hood, Meridian, acting state national committeeman for the pro-Truman faction of the Democratic party.

Hood is quoted as saying, "If the Mississippi legislature will pass a barrel tax on all crude oil shipped out of the state for processing, it can get enough money to pave all our farm-to-market roads without a cent of cost to the taxpayers. Every major oil-producing state has a tax, with the single exception of Mississippi, which is being exploited to the limit."

Mississippi is currently ninth among the oil-producing states with a daily production of around 95,000 bbl. However, the state has only two very small refineries. Paluxy Asphalt Co. has a 3,500-bbl. plant at Crupp, and Southland Oils, Inc., runs a 4,500-bbl. refinery at Sandersville.

Louisiana Hikes Allowable

BATON ROUGE.—Louisiana, third largest oil-producing state in the nation, is raising its December crude-oil allowable despite a drastic cut for the same period by Texas, its neighboring state and the nation's largest crude producer.

The state department of conservation has set an allowable of 563,157 bbl. daily for December, highest in the state's history. Actual production, based on this allowable, is expected to be 535,657 bbl. daily for December. Current production is 531,500 bbl. daily with an allowable of 557,000 bbl.

Louisiana allowables have been steadily rising during 1949 with the exception of July, when a 10 per cent cut was made. Last year's production, at this time, was 37,000 bbl. below the current production.

The Texas Railroad Commission 2 weeks ago reduced that state's December allowable to 218,357 bbl. below the current figure. This sharp slash followed 3 months of increased allowables.

New Research Facilities

HOUSTON.—Work has begun on a $130,000 building to increase Shell Oil Co.'s production and pipe-line research facilities here.

The structure will be occupied under lease agreement by three units of Shell's research setup — regional and Houston area production laboratories and the Shell Pipe Line Co. laboratory. Completion of the new building is scheduled for April 1, 1950. It will have approximately 10,000 sq. ft. of floor space.

Shell already has one of the largest research laboratories in the Gulf Coast area in Houston. It is a $1,300,000 exploration - production research building on Bellaire Boulevard. The new lab is being built adjacent to this large unit.

With the new building available, the regional production laboratory, heretofore devoted entirely to pressure - volume - temperature analyses, will branch out to incorporate a section for the study of physical and chemical properties of rocks and a mud-analysis section. The area production unit will continue to act as a service group for the Houston area production department. It will have facilities for core and cutting analyses, a localized applied research section, a photo - micrographic section. The Shell Pipe Line Co. lab will include both service and development units.

Plant Begins Operations

HOUSTON. — Operations have begun at Humble Oil & Refining Co.'s new 100,000,000-cu. ft. daily gasoline plant 2 miles south of Opelousas in South Louisiana.

This absorption-refrigeration type natural-gasoline plant will extract natural gasoline, butane, and propane from the gas transported through Interstate Natural Gas Co.'s Baton Rouge-West system. Gas for this line is gathered from Humble's North Crowley, North Tepetate, and Pecan Island properties, and from other operators' properties in the Branch, North Cankton, Shuteston, South Shuteston, Bayou Mallet, and Lewisburg fields. After extraction of the liquid hydrocarbons, the gas is returned to Interstate's line for marketing.

The Opelousas plant will recover approximately 1,780 bbl. of liquid hydrocarbons daily. This total consists of 750 bbl. of propane, 280 bbl. of isobutane, 260 bbl. of normal butane, and 490 bbl. of natural gasoline. These recoveries are based on a normal operating load of 100,000,000 cu. ft. of inlet gas daily.

Mississippi Production

JACKSON. — Detailed figures just released by the state oil and gas board attribute a significant decrease in Mississippi's September crude production to Mallalieu field, Lincoln County.

Mallalieu field produced 330,000 bbl. from 94 wells or a decrease of 108,509, as compared with August production. The state as a whole registered a decline of 148,886 bbl. to produce a total of 2,960,353 bbl. for September.

One new field was reported for the month to bring the total number of fields in the state to 28. Daily average production was 98,678 bbl. or a daily average per well of 69 bbl.

***COMPRESSOR GOES IN:** Workmen jockey a 1,000-hp. compressor into position on the prepared concrete foundation at a new South Texas compressor station of Tennessee Gas Transmission Co. near the southern end of the line which stretches from the Rio Grande Valley to West Virginia. Seven other compressors will be installed here to give this station a total horsepower of 10,400. This is part of a very active construction program of T.G.T. Work is well along on 907 miles of additional loop and gathering lines and new compressors which will raise capacity of the line from 615,000 to 831,000 M.c.f. daily*

Pressure Control

New recording instrument may aid pipe lining and permit shipment of more light products with crude

Paul Reed

TULSA. — Continuous recording of vapor pressure is now being tested by Stanolind Pipe Line Co. with an instrument which has promise of wide use in future pipe lining, particularly where natural gasoline and other high-vapor-pressure products are mixed in the crude-oil stream.

The instrument is a recent development of the research department of Standard Oil Co. (Ind.). Stanolind's test is currently being conducted at its Lake George junction.

Vapor-pressure data would be useful to Stanolind Pipe Line Co. in considering future programs for handling mixtures of crude and casing-head gasoline. Under present conditions, for instance, it is regarded as desirable for pipe-line shipments not to exceed 8 lb. R.v.p. There is a possibility that after July 1, 1950, the vapor pressure of shipments delivered from West Texas to northern refineries may be raised to 13 lb.

Significance.—For 20 years numerous attempts have been made to devise instruments which would continuously record vapor pressure in a satisfactory manner. The common method of making a Reid vapor-pressure reading requires taking a sample from a tank or pipe line and making a test under controlled conditions.

Better knowledge of the vapor pressure in a pipe line would have important advantages in the transportation of crude oil and casing-head products in a mixed stream:

1. Uniformity of the vapor pressure of the stream could be maintained; this is desirable for efficient pumping and handling in refinery tankage, as the pressure must not exceed the point for which tanks are designed.

2. Prevention of excessive vapor pressure safeguards against vapor lock caused by a gas bubble in a pipe line which stops pumping operation of a centrifugal pump and is hazardous for a reciprocating pump because the hydraulic ram effect, due to surges in the crude-oil stream, may break gears and burst pump fluid chambers and station piping.

3. Maintenance of uniformity of vapor pressure is beneficial both for operation of a line with tanks at intermediate stations and for operation of a system without tanks at intermediate stations, known as a closed system. Pipe-line experience in the past 10 years has demonstrated the advantages of moving high-vapor-pressure crude-oil mixtures in a closed system.

An instrument for continuous recording of vapor pressure at many points on a pipe line, if it proves practical in actual operations, might facilitate three developments, important to the entire oil and gas industry, which already are in use to some extent.

When natural-gasoline and other high-vapor-pressure products are mixed in the crude-oil stream, these casing-head products can move to refineries from the field, where otherwise they might not have been fully utilized. An increase in this practice would not only reduce economic loss of these light products but also offers an easy method of transporting them.

Because of the low viscosity of the light products, a crude-oil line can be pumped at its full rated capacity of crude oil plus an appreciable volume of casing-head products, thus giving the light products a "free ride" and increasing the effective capacity of the nation's pipe-line system.

The new instrument may also have important applications in product pipe lines which batch products of different vapor pressures, such as fuel oil, motor fuel, and aviation gasoline. It could serve to identify changes in the flash point of fuel oil, and would facilitate more accurate switching of the various batches on their arrival at delivery points.

It is recognized that something more than gravity measurement is needed to differentiate motor gasoline from aviation gasoline moving through pipe lines. Vapor-pressure tests, however, give sufficiently distinctive data for ready identification, which suggests that an effective instrument for its continuous recording would be a valuable aid in handling such products batched in a pipe line.

New Porosimeter

BARTLESVILLE. — An improved porosimeter which measures porosity of cores by gas displacement with applications of Boyle's and Charles' laws has been developed by the Bureau of Mines at Bartlesville.

Extraction of hydrocarbon content is carried on in a conventional manner. Porosity is measured by the difference in void space in a bomb with and without the core sample in the bomb, and the bulk volume of the core as measured by a pynconometer.

The instrument is described in the bureau's Report of Investigations 4548, which includes drawings and photographs of the equipment and a detailed description of their use. The publication is available upon written application to the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa.

Next Week

Control valves.—Article on fundamentals on sizing and type selection, without complicated mathematics. Examples in diagram form from actual installations. This material will be of much practical value in refining and other plant operations. Author J. A. Pellettere is instrument engineer with Gulf Oil Corp.

Pipe-line calculations.—Lowell E. Anderson, engineer with Stanolind Pipe Line Co., presents useful formulas and charts in his report, "Crude-Oil Flow Characteristics Experienced in Large-Scale Lines."

Oil-base mud.—From California comes an article on advantages in drilling and well completion. This material, together with operating experiences for various situations, is given by G. V. Kersten, with Western Gulf Oil Co.

Helicopters?—Charles J. Deegan of the Journal staff tells how these craft now aid oil exploration in southern Louisiana.

Corrosion.—Its mitigation within dehydrating tanks is outlined by Ernest O. Kartinen, Signal Oil & Gas Co.

Processing oil shale.—Robert Harwick of the Journal's engineering staff describes developments 200 miles west of Denver, and research work by Union Oil Co. on retort design and operation.

Pressure maintenance.—Application of water injection in New Hope field, Franklin County, Texas, is reported by A. S. Trube and S. M. DeWitt, with Tide Water Associated Oil Co. at Houston and Seaboard Oil Co. at Dallas, respectively.

New Find in Japan

Successful deep-zone drilling in big Yabase field suggests reduction of United States, British imports

TOKYO.—Representatives of American and other foreign oil companies are watching with interest the mounting success of new deep-zone drilling at Yabase, Japan's most productive oil field.

Although only about 1,500 bbl. have been produced daily at Yabase, a small amount in contrast to American and mid-Eastern production, this quantity accounts for 35 per cent of all Japan's oil output.

If the additional deep-zone wells being drilled in Yabase field continue to prove as successful as the first one, the increased local flow may put a serious dent in current imports of American and British-Dutch oil interests. Since the war these imports have consisted primarily of refined oil products. Only late in September was permission given by occupation authorities for Japanese interests to resume operation of their Pacific coast refineries by importing crude oil.

During the past 2 years at Yabase the Japanese have been exploiting Zone VII at 3,400 ft., where initial production is rarely more than 150 bbl. daily. Discovery of the new, deep Zone VIII early this year considerably enhanced possibilities of increased production in this field, according to the head of the petroleum branch in General McArthur's Natural Resources Section.

Large area involved.—The first well recently completed to produce from Yabase's new Zone VIII flowed 272 bbl. during the first 24 hours from a depth of 3,800 ft. Three additional outpost wells drilled to the new zone since then have shown the productive area to be even greater than at first anticipated.

The deep-zone exploration is being carried out by Imperial Oil Co. This firm, owned half by the Japanese Government and half by private capital, controls more than nine-tenths of the oil fields in Japan. American geologists assisting the company estimate that the reserves proved in the new deep zone total about 6,000,000 bbl., a significant addition to the former proved reserve of 15,000,000 bbl. for all Japan's fields.

Approximately 60 development locations have been proved already by the outpost drilling program. With a maximum drilling capacity of six rigs at Yabase, it will take Imperial an estimated 2 to 3 years to drill up these reserves. Already Japan's production of crude oil has increased from 3,800 bbl. daily during August to 4,500 bbl. daily in October, principally as a result of the new discoveries.

New equipment in use.—Exploitation of the new proven reserves will be a major factor in Imperial's future drilling program. But other events in Japan's oil future may have even a more drastic effect on foreign imports. New seismic reflection equipment, recently imported by the Japanese company, has proved the existence of a large anticline on the western side of Yabase field. The anticline lies parallel to the anticline containing Japan's largest oil field. U. S. Army geologists feel that the newly discovered anticline could be as large a producer of oil as Yabase itself, and Imperial is planning to test the structure by drilling in the near future.

In a country which has never produced much over 10 per cent of its own crude oil, Yabase's new deep-zone exploration and discovery of the second large anticline in the same area may be comparable to the finding of a Signal Hill.

Other evidence at Yabase's present field suggests that permeability or lithologic control may play an important role in determining future productivity. "In the light of the local variation apparent in the stratigraphy (at Yabase)," an American geologist said, "it is remarkable that the Japanese have paid little attention to the possibility of finding oil in stratigraphic traps."

Field not defined.—Even before discovery of the new deep-zone reserves, it was estimated that Yabase contained 40 per cent of Japan's proved oil reserves. Limits of the field are not fully determined, but more than 600 wells already have been drilled at Yabase since it was located 15 years ago. The Yabase structure is a gentle anticline with a larger gathering area than most structures in the district. Located in the Akita district of northern Honshu next to the Sea of Japan, Yabase has nine producing zones. The upper zone in the Sasaoka formation is found at a depth of about 300 ft. Oil zones in the Katsurane formation are found at depths of approximately 600, 800, 1,100, and 1,200 ft. The lowest zone in the Katsurane formation is at the contact between the Katsurane and Funakawa formations. Two producing zones in the Funakawa are at depths of some 1,300 and 2,500 ft., while the deep zone near the top of the Onna-

Antiquated equipment has held back progress in Japan's oil fields. The Japanese are anxious to secure more modern equipment, and recently Imperial Oil Co. obtained a large-scale rotary rig with which it reached a new deep zone at Yabase. (U. S. Army photograph)

gawa is about 3,300 ft. down. Many wells, particularly in the Katsurane formation, have been producing from more than one zone.

The new developments at Yabase are especially significant in view of last year's decrease in Japanese oil production. The country's crude oil output averaged 3,070 bbl. daily in 1948, a decrease from 1947's 3,500-bbl. daily average. The number of producing wells also dropped, from 4,058 in March 1947 to 3,712 in March 1948.

While the low output last year was caused primarily by a month-long strike and go-slow tactics, without successful new exploration Japan's oil outlook would be dark indeed. Most producing fields are fully drilled up and nearing depletion. However, a long-range petroleum exploration program was established more than 2 years ago under the guidance of the Petroleum Resources Development Promotion Council, an organization composed of leading petroleum geologists from Japanese universities, private firms, and the government. The council has planned additional exploratory drilling for Imperial and other companies, and is continuing an intensive program of geological exploration, with assistance of NRS petroleum experts.

The council aided in the discovery of new reserves equal to about 1 year's production during the Japanese fiscal year ending in April 1948. Since then exploration drilling has added a new deep pool in Yabase, a new pool in Kaji field, a minor new field possibility at Nishi-Ishinazaka, and a few extensions of other fields.

A new wildcat well at Toyotomi in northern Hokkaido, Japan's northernmost main island, produced gas at the rate of 313,000 cu. ft. daily. Deeper oil prospects of this significant structure awaited the availability of heavier drilling equipment, according to last reports from occupation officials.

Further study planned.—Before the surrender, Japanese had given little attention to prospects in sedimentary basins other than those in northwestern Honshu (Japan's main island) and central Hokkaido, all parts of a belt more than 600 miles long. Now oil seepages are known to exist in eastern Hokkaido, where a large Tertiary basin exists. NRS geologists also have reported Tertiary embayments along the Pacific coast of Honshu which "warrant further investigation." One such basin in Shizuoka prefecture near Tokyo has produced some oil and others have indicated they contain oil.

After surveying Japan's petroleum resources and production following the occupation, American petroleum geologists reported: "The application of geological science to oil exploration in Japan is more backward technologically than was expected. Areal geological mapping in the producing basins is incomplete and unreliable. Geophysical methods have only been applied on a small scale during the last 3 years to extensive and significant alluvial areas. Regional subsurface studies have not been attempted and the application of micro-paleontology to regional correlation has not passed the basic research stage."

OIL FACTS ABOUT JAPAN

Total production, 1874-1946, bbl.	89,841,372
Estimated proved and developed reserve (not including Yabase's new deep zone) bbl.	15,570,000
Total annual production, bbl.	1,482,578
Number of fields producing	50
Number of wells producing	4,190
Average daily production per well, bbl.	0.97
Total acreage proved and developed, acres	11,455
Average indicated recovery on Hokkaido, bbls. per acre	875
Average indicated recovery in northwestern Honshu (all fields), bbl per acre	10,000
Average indicated recovery in northwestern Honshu (best fields) bbl. per acre	35,000
Over-all drilling density, acres per well drilled	1.1

But today, while the geologic picture and past records of producing districts do not especially encourage an expectation of major discoveries, the geologists admit that "important territories undoubtedly remain, both within and outside the present producing districts." These districts, they explain, are either imperfectly known or modern techniques of exploration have not yet been applied.

Yet many difficulties have to be overcome before efficiency on the American scale can be obtained in Japanese oil production. Little attention has been given to gas-oil ratios and conservation of gas in developing fields. Wells have been closely spaced, partly because of insufficient knowledge of subsurface conditions and partly because of efforts to secure additional oil from depletion-type fields in which the initial gas pressure had not been used efficiently.

Methods are old.—Gas lift and other stimulating methods for prolonging the producing life of wells have not been used by the Japanese. Nearly all wells are electrically pumped from central plants, few of the wells having individual pumping units. Wholly integrated well-pulling machines are used in some fields, but many fields operate with antiquated methods. Common cup-type and spiral-wrapped plunger pumps have been used in more than 95 per cent of the wells. A few insert-liner pumps are used.

Infiltration of sand and water causes considerable pump trouble, and on an average pumps have to be repaired at least once a month.

Also, transportation facilities within the fields are inadequate, trucks usually being able to travel only on entry roads to the fields. Many fields are in soggy rice paddies or hilly, wooded areas that cause serious road construction problems. Thus, wells often are reached only by animal-drawn carts over what amount to no more than foot trails. Because of such transportation bottlenecks, portable well maintenance units seldom are used. In many fields rods and tubing are removed by manual labor. Bull wheels often are equipped with cleats on which the workers tread, actually walking the rods and tubing out of the well.

In addition to such obstacles, a few salient statistics on petroleum production in Japan, as of 1946, which also must be taken into account when forecasting the industry's future are shown in the table above.

Success rate high.—Last year 33 exploration wells were completed, 14 of them producers bringing in a total initial daily production of about 300 bbl. Although early production from the exploration wells was low, occupation geologists feel encouraged because of the high success rate of 43 per cent.

Consumption of petroleum products in Japan during 1948 totaled 10,949,300 bbl., yet only 1,116,085 bbl. of the products were produced from indigenous sources. Locally refined lube oils provided 26 per cent of the requirements and kerosine 51 per cent, but the bulk of imports consisted of diesel and fuel oil.

Now that General MacArthur has permitted Japan's Pacific Coast refineries to resume operation for the first time since the war, however, imports of crude oil gradually will replace imports of petroleum products—at an estimated saving of some $10,000,000 annually to the country. The first five refineries are scheduled to be rehabilitated and prepared to receive crude oil by January 1. The Japanese hope that more and more of it will be coming from Japan's own rapidly developing fields.

CANADA

Imperial Seeks $50,000,000

Imperial Oil, Ltd., leading Canadian producing and refining company, has announced plans to borrow $50,000,000 to carry on its major expansion and development program.

The new financing will be in $40,000,000 of 3 per cent 20-year sinking fund debentures and $10,000,000 of 2½ per cent 3 to 10-year serial debentures. They will be offered in Canada only and will be available through a large group of investment dealers. The money will be used to refund outstanding debentures and to provide additional working capital.

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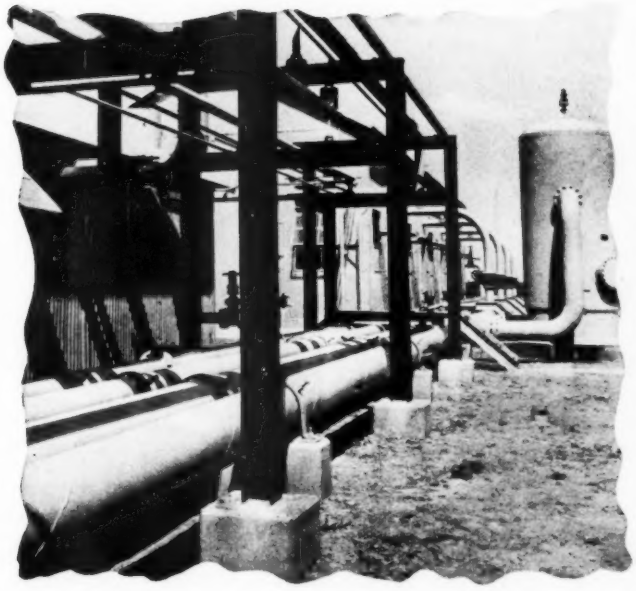

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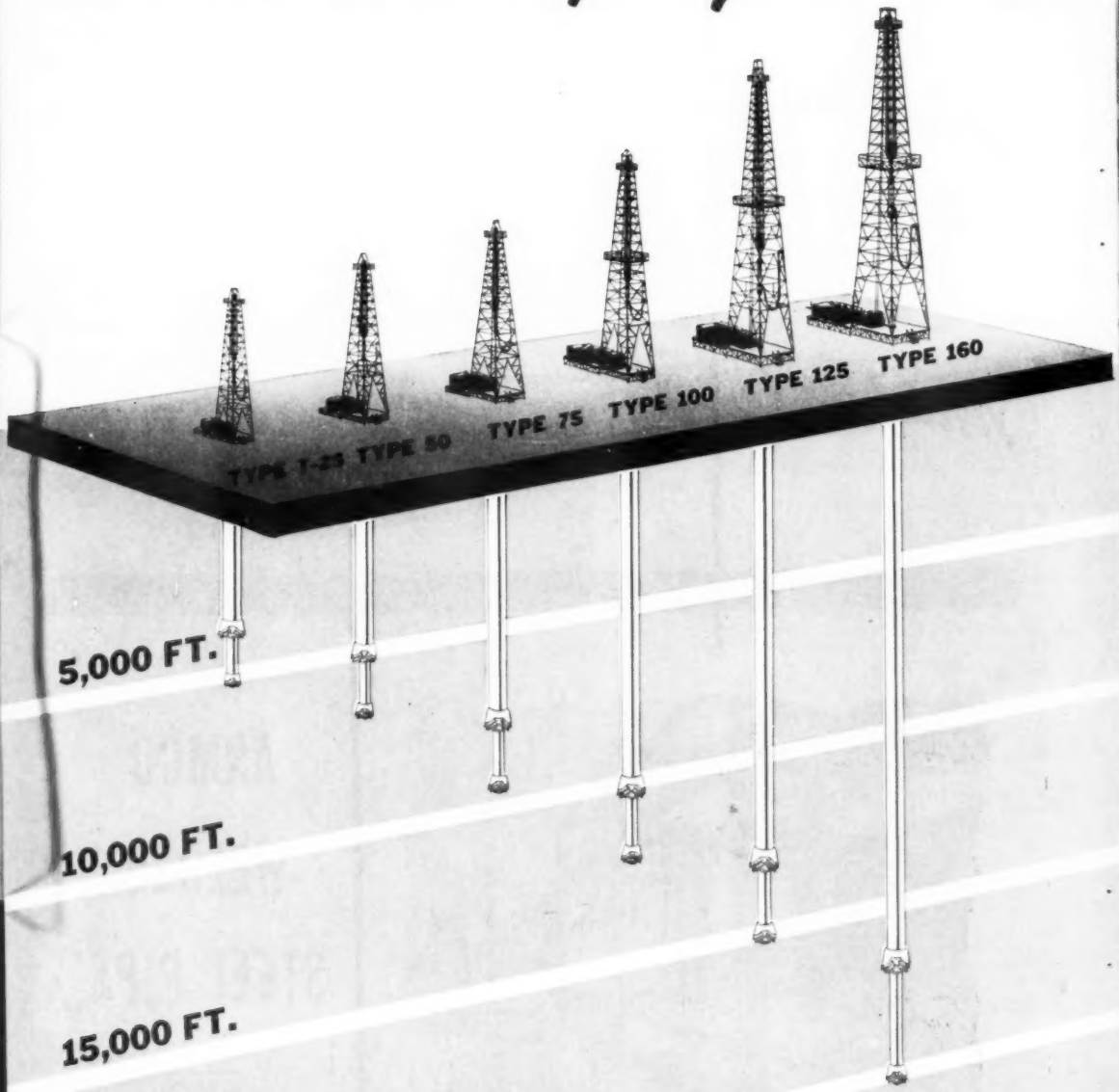

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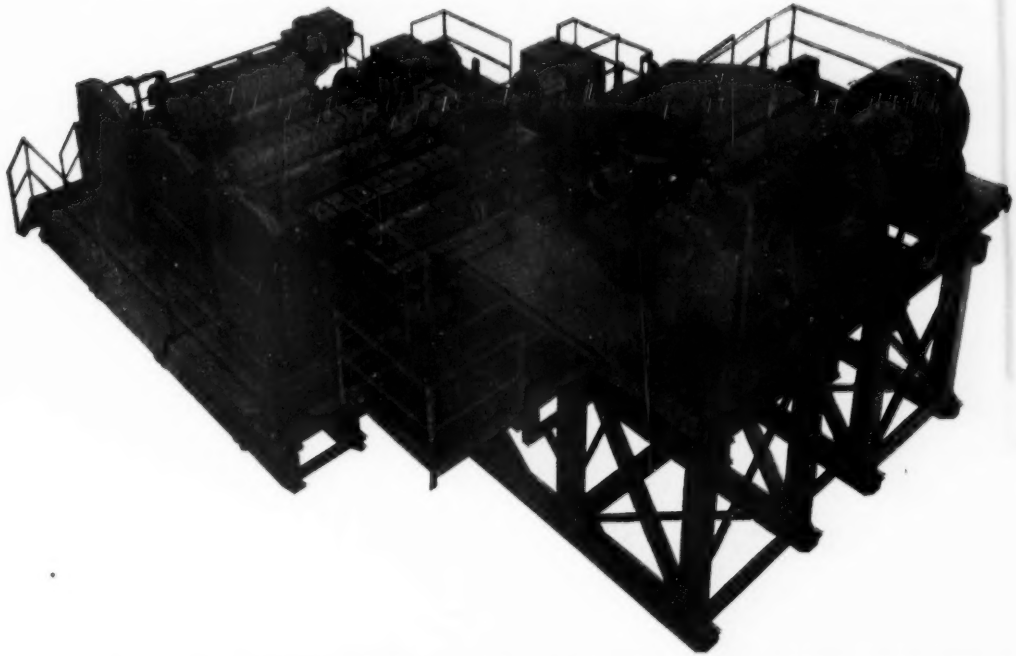

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MEXICO

Wildcat Finds Oil

American Independent's first well under Mexican contract tests 1,170 bbl. daily from 4,680 ft.

Dahl M. Duff

SUCCESSFUL production tests have been made by Mexican American Independent Oil Co. in 1 Tortuguero in southern Veracruz in the Isthmus region of Mexico.

An announcement in Mexico City November 24 by Petroleos Mexicanos said the well found pay sands at 4,680 ft. and that production tests indicated 1,170 bbl. daily of light oil.

Antonio J. Bermudez, director general of Pemex, said the well opened up a new field which has an indicated area of 74,100 acres. He apparently referred to the results of geophysical work previously carried out in the area.

Directional hole. — The well was spudded in October 13 and reached 1,531 ft. of October 25. It is located on the beach about 13 miles east of the port of Coatzacoalcos (Puerto Mexico) and is a directional hole bottomed a short distance offshore.

The area has not been heretofore developed. The well's location places it about 10 miles northeast of the old abandoned Isthmus field of Santa Rosa.

Mexican American Independent is reported to have not yet begun its second wildcat operation. It was earlier announced this second test would be at Xicalango, near Ciudad de Carmen in the state of Campeche. During the present rainy season operations are difficult in these swampy locations. Drilling contractor for the company is Kerr-McGee Oil Industries, Inc., operating in Mexico as Kermac, Inc.

The Tortuguero well is the first to be drilled by Mexican American Independent under the percentage contract it negotiated last March with Pemex. The contract was said at the time to have ushered in a new era of American participation in the Mexican oil industry. Majority interest in the operating company is held by American Independent Oil Co. headed by Ralph K. Davies. Other partners are Edwin W. Pauley and Signal Oil & Gas Co. Under the contract, expenses are paid from 50 per cent of the production with the company afterwards receiving 15-18 per cent of the production for its risks.

Loan talks resumed.—Meanwhile, reports were current in the financial district in New York that Mexican Government officials have unofficially resumed discussions over a $200,000,000 loan from the United States for development of Mexican oil.

Antonio Carrillo Flores, director general of the Nacional Financiero, the Reconstruction Finance Corp. of Mexico, was reported in Washington on the matter. Negotiations for the loan were dropped earlier this year after a cool reception was encountered in the U. S. State Department.

EUROPE

Halt to Dismantling

The Western Powers have agreed to halt the program of dismantling Germany's synthetic oil and rubber manufacturing plants.

This became known last week in the disclosure of the terms of a broad agreement reached by United States, Great Britain, and France with the Western German Government. In return for the concessions on dismantling and reparations, Germany agreed to maintain demilitarization and prevent the revival of any totalitarian government.

Eleven synthetic oil and rubber plants have been removed from the dismantling list and the removal work is to be ceased except for certain research equipment and electrical furnaces not essential to plant functioning. The dismantling program has been strenuously resisted by the Germans, and troops were called out on occasion. Most of the plants are in the British Zone.

Under the new agreement, Germany is also permitted to build an unlimited number of tankers up to 7,200 tons, including ships for export, and to repair foreign ships without restriction.

Austrian Oil Truce

WASHINGTON.—Nearly 2 years of negotiations for a peace treaty with Austria were reported to Washington this week to be on the verge of success, with only three paragraphs in the proposed treaty still in dispute.

Agreement has been reached on the principal point of discussion in the settlement of German assets—oil —authoritative sources here said.

Under the peace treaty as now written, Russia will get 60 per cent of Austria's oil production, a similar percentage of explorable lands, 420,000 tons of refining capacity and certain distribution facilities—a going oil industry, in fact. Russia will also have the right to export the profits from operations of these facilities, which means that much of the oil produced and refined will have to be marketed in Austria.

The American interests in Austrian Oil are held through Socony-Vacuum and Shell, who are expected to continue to operate within the framework of what is left after the Russians get their share.

The major subjects of dispute between the Russian and the Western Powers were over exploration and refineries. Russia, in asking for 60 per cent of the explorable land included all of the best potential oil lands of the country, and at the same time rated the over-all refining capacity much lower than the Western Powers held it to be in an apparent effort to get more of it in the 420,000 tons awarded.

The big advantage to the Western Powers in concluding the treaty is that it will get the Russians out of Austria and Russian troops out of Hungary and Romania, which constitute the "line of communication."

French to Seek Grants

WASHINGTON.—The French Government, early next year, may ask the Economic Cooperation Administration for grants for the purchase in this country of petroleum coke and synthetic rubber by private French enterprises.

These items were included in a list of products which the French Government proposes to permit its industries to import, and it is now receiving applications to be considered for dollar credits and import permits.

The amount of dollar credits which will be authorized for specific commodities has not yet been fixed and so far as can be learned the list is merely an indication of the types of items for which France proposes to request ECA financing, beyond the commodities, such as crude petroleum and its major products, which are imported by French governmental agencies.

AUSTRALIA

Gasoline Rationed

Motor-fuel rationing has been reintroduced throughout most of Australia after several months of consumption without legal restrictions.

The Australian high court last summer invalidated the wartime regulations under which the federal government administered rationing. It has been resumed under state powers

except in Tasmania, where it was rejected by the state parliament.

Australia's oil rationing is the result of the country's dollar shortage. Its currency situation does not permit unrestricted imports.

Another and a more encouraging note on rationing came last week from Sweden. In that country, motor fuel was taken off the ration list after 10 years of restrictions.

MIDDLE EAST

Afghanistan Gets Loan

WASHINGTON. — Afghanistan last week was added to the list of customers of the Export-Import Bank, securing a credit of up to $21,000,000 to assist in financing the purchase of United States equipment, materials, and services required for construction of a dam and completion of a canal system.

Part of the credit is to be used for offshore purchases of fuel oils and lubricants required on the project, the volume of which was not disclosed and probably has not yet been figured out.

The granting of the loan was seen in Washington as of political importance through the support it gives to a nation smack up against soviet Russia, which will undoubtedly propagandize it as another move in the attempt of the capitalistic countries to encircle Russia.

Afghanistan lies directly south of Russia, between Pakistan and Iran, but so far has given no indications that it shares in the latter's oil resources.

Exploration Firms Formed

Two new companies have been organized in Tunisia to explore for and develop oil in that country. They are Soc. Nord Africaine des Petroles with a capital of 1,500,000,000 francs and Cie. des Petroles de Tunisie with a capital of 300,000,000 francs.

The formation of the companies was announced in the Tunisian Journal Officiel in Algiers. Their shares may be ceded to foreign companies with the agreement of the Tunisian Government.

Early this year, French officials in Paris reported that concessions in Tunisia would be granted to two mixed companies with Gulf Oil Corp. holding 65 per cent interest in one and Shell a similar interest in another.

Yemen Wants to Talk Oil

The Government of Yemen has announced it is receptive to any possible further offers for oil exploration rights in the country. A statement by the Yemen minister of state issued in Cairo said:

"The Yemenese King and Government now have no opposition to conversations with oil companies and possible oil prospecting if they thereby can secure benefits for the Yemenese Government and its people."

It was reported earlier this month that concession negotiations with Yemen had been broken off by unidentified oil companies after the government submitted an unacceptable list of conditions.

Egypt to Relax Oil Ban

The Egyptian Government is considering relaxing restrictions against shipping calling at its ports and bound for Israel.

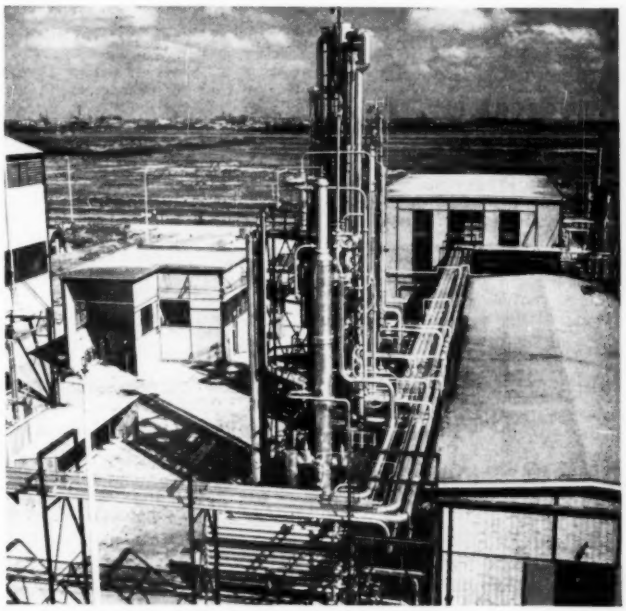
Through its control over Suez Canal movements, the Egyptian Government has been able to block oil cargoes from the East going to Israel and the Consolidated Oil Refineries, Ltd., plant at Haifa. The refinery has been running on Venezuelan crude.

A Cairo report said, however, it is not known whether oil from the Far East will be excluded from the ban on military supplies and other goods which the Egyptian authorities consider "war contrabrand" pending the settlement of a peace treaty.

Topping Plant Finished

Iraq Petroleum Co., Ltd., has completed construction of new facilities at its topping plant in Tripoli, Lebanon, which permit an increase in the plant's capacity to about 1,700 tons (11,000 bbl.) daily.

The plant previously was able to run only a few thousand barrels daily. I.P.C. has placed in operation its new 16-in. pipe line paralleling the existing 12-in. from Kirkuk field in Iraq to Tripoli. The lines will deliver about 130,000 bbl. daily at full capacity, and crude not processed is lifted for offshore shipment.



DUTCH PETROCHEMICALS: First of its kind in Europe, this new plant of Bataafsche Petroleum Maatschappij, near Rotterdam, will produce synthetic detergents from paraffin wax and plastics from refinery gases. It is one of a group operated by the Royal Dutch-Shell interests, others being in England and the United States. Currently the plant obtains gases for conversion to polyvinyl chloride resins from outside sources but it will be tied in with Bataafsche's nearby Rotterdam refinery when expansion and modernization program is completed there, scheduled for 1952. The refinery now is running 57,000 bbl. of crude daily, but will have a capacity of 70,000 bbl. per day and will also have new atmospheric and vacuum distillation units, thermal reforming, and catalytic cracking units. The atmospheric unit will have a capacity of 30,000 bbl., and the catalytic unit a capacity of 15,000 bbl. per day

PERSONALS

Joins Gulf

Pogue, oil economist, on board of directors

JOSEPH E. POGUE, petroleum economist and vice president of Chase National Bank of New York City, has been elected a member of Gulf Oil Corp.'s board of directors. He will also serve the company in a consulting capacity.

Pogue's election has not increased the number of members on Gulf's board, as a place was vacated by the recent death of W. L. Mellon, one of the firm's founders.

Following his education at the University of North Carolina, Yale University, and Heidelberg University, Pogue began his business career in 1909 as assistant curator of mineralogy and petrology at Smithsonian Institution, Washington, D. C. Four years later he became associate geologist with U. S. Geological Survey, and in 1914 was appointed associate professor of geology and mineralogy at Northwestern University.

He served as assistant director of the Bureau of Oil Conservation, U. S. Fuel Administration, during World War 1. Later he joined Sinclair Consolidated Oil Corp. as manager of economic research. In 1920 Pogue turned consultant, and operated his own consulting engineering firm until he joined Chase National Bank in 1936. He will relinquish his position as vice president of the bank at the end of the year, but will serve in an advisory capacity.

He was appointed a member of an advisory committee on economics to the Interstate Oil Compact Commission in 1938, and when the Petroleum Industry War Council was organized at the beginning of World War 2, he was made special assistant to the chairman and subsequently assistant to the chairman of the national oil policy committee of the council. In June 1946, he was made a member of the National Petroleum Council.

Richard Morton has been appointed eastern representative for Born Engineering Co., Tulsa, and will be headquartered in New York City where he has been active in petroleum-refinery engineering. He formerly was with Hydrocarbon Research, Inc.

R. C. Granberry, division petroleum engineer, Humble Oil & Refining Co., Corpus Christi, has been elected chairman of the Southwest Texas Section, American Institute of Mining and Metallurgical Engineers. Other officers elected were: **D. A. Davidson,** district superintendent, Pan American Production Co., Lyford, Tex., vice chairman; and **Lee J. Thronsen,** district engineer, Sun Oil Co., Corpus Christi, secretary-treasurer. Directors elected include: **Charles H. Snellson,** district production superintendent, Seaboard Oil Co. of Delaware, Corpus Christi; **Houston Parish,** owner of Engineering Service Co., Corpus Christi; **E. C. Sargent,** manager of exploration and production, Holly Development Co., Corpus Christi; **Harry Vaughn,** engineer, Lane-Wells Co., Corpus Christi; **Dr. Frank H. Dotterwich,** head of the petroleum engineering department, Texas A. & I. College, Kingsville; **J. B. Jones,** division sales manager, Halliburton Oil Well Cementing Co., San Antonio; **Austin Shook,** district petroleum engineer, The Texas Co., Alice; and **George Wilson,** district engineer, Magnolia Petroleum Co., Alice.

Douglas N. Ezell, chief process engineer at the Magnolia Petroleum Co. refinery in Beaumont, Tex., has been named superintendent of manufacturing at the Ras Tanura, Saudi Arabia, refinery of Arabian American Oil Co.

George T. Vanderbilt, head of Standard Oil Co. (Ohio) Organization and Methods Section, has been named assistant to the vice president in charge of accounting.

E. V. Murphree, president of Standard Oil Development Co., will be awarded the Perkin Medal for outstanding work in applied chemistry, on January 6 at a dinner in his honor at the Waldorf-Astoria Hotel, New York. The award is given by the American Section of the Society of Chemical Industry.

L. F. McCollum, president of Continental Oil Co., Ponca City, Okla., has been elected a director of J. P. Morgan & Co., Inc., New York.

Herbert A. Gustafson, formerly senior maintenance engineer for Standard Oil Co. (Ohio), Refinery Control Division, has been named staff assistant to **R. S. Stewart,** assistant to the president.

A. L. Roberts has been named general superintendent of Texas Gas Transmission Corp.'s pipe-line system, and **H. L. Stowers** has been appointed chief engineer for the company. Roberts has been active in pipe-line work since 1927. He joined Kentucky Natural Gas Corp., a predecessor company of Texas Gas, in 1930, as district pipe-line superintendent. Stowers joined Memphis Natural Gas Co., also a Texas Gas predecessor, in 1937 as assistant chief engineer, and in 1944 was named chief engineer. Last June he took over duties of chief engineer when work started on the Texas Gas Texas-Ohio pipe line. He is a graduate of University of Oklahoma.

A. L. ROBERTS

H. L. STOWERS

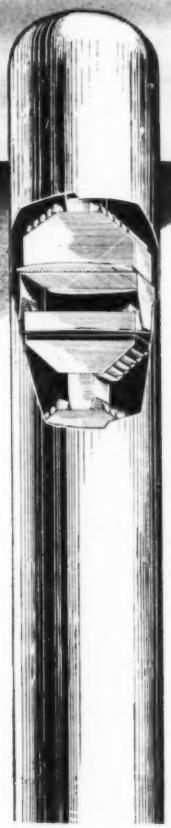
C. D. Mims has been appointed general manager of production for California Standard Co., and will have under his jurisdiction all production and drilling operations. Prior to his transfer to Calgary, Alta., Canada, he was in charge of producing and development in the Snyder, Tex., area, for Standard Oil Co. of Texas.

R. W. Walters has been appointed exploration manager for the producing department of Imperial Oil, Ltd., succeeding **J. B. Webb,** who resigned. Walters formerly was with Standard Oil Co. of Louisiana and Carter Oil Co. While with the latter company he spent time on assignments in Argentina, the Dominican Republic, and Cuba. He transfered to Imperial Oil in 1946, and in March was named assistant exploration manager.

Holland Young Blades, veteran of more than 50 years with C. C. Wakefield & Co., Ltd., London and New York, will retire from active service

a new

HIGH



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PERSONALS

at the end of the year. He was one of eight who joined with Viscount Charles Wakefield when he founded the firm. Elected a director in 1938, he later became joint managing director. Blades will continue as a director following his retirement.

R. G. Hamilton, who resigned from Schlumberger Well Surveying Corp. recently to open offices in Tulsa as a consultant, has established a new type of consulting service and will specialize in advisory service on interpretation and evaluation of electric logs, including micrologs and dipmeter surveys. Hamilton is a graduate of DePauw University and University of Iowa.

J. J. McCart, formerly pipe-line foreman of District 9, Panhandle Eastern Pipe Line Co., has replaced **K. R. Springer** as district foreman, and Springer has been transferred as foreman to District 6, Boonville, Mo. He replaces at Boonville **John E. Steward,** who moved to Stinnett, Tex., where he replaced **W. C. Spellman** as foreman of District 1. Spellman has taken over duties as foreman of District 2, Liberal, Kans.

Frank W. Ficklin, engineer for Sunray Oil Co. at Lubbock, Tex., has been transferred in a similar capacity to Snyder, Tex.

G. E. McClatchey, New Orleans, district engineer for Barnsdall Oil Co., has been transferred to Gulfport, Miss., where he is engaged in offshore drilling operations.

Glen C. Templeman, chemist for Ohio Oil Co. at Lorell, Wyo., has been transferred to Robinson, Ill., in the same capacity.

Ervin G. Bilderback, petroleum engineer for Magnolia Petroleum Co. at Midland, Tex., is now engaged in engineering work on a survey of the Luling, Tex., field.

L. A. Bell, district foreman at Bairoil, Wyo., for Sinclair Oil & Gas Co., has been transferred to Oklahoma City as assistant district superintendent.

P. J. Rosenlieb, formerly superintendent at West Edmond field of Oklahoma for Sohio Petroleum Co., is now district superintendent for the firm at Evansville, Ind.

Robert S. Clark, Phillips Petroleum Co. geologist at Tallahassee, Fla., is now serving in a similar capacity at the company's Jackson, Miss., offices. **J. C. Burtner,** driller at Texhoma, Okla., has been transferred to Dumas, Tex., in the same capacity.

Griffith L. Humphreys, Calgary, Alta., Canada, has been appointed secretary of Western Canada Petroleum Association of Calgary, to fill the vacancy caused by the death of E. W. Kolb, who served as secretary of the association since its inception in 1938. Humphreys, formerly with Canadian Bank of Commerce, joined Imperial Oil, Ltd., in 1927, and remained with that firm until recently.

E. A. Robb, tool pusher at Powell, Wyo., for Pioneer Drilling Co., Inc., has been transferred by the firm to Edgerton, Wyo.

Maurice Lewis, Jr., exploitation engineer for Shell Oil Co., Tulsa, is now serving as field engineer at Wichita Falls, Tex.

B. M. Choate, district geologist for Atlantic Refining Co.'s Mississippi-Alabama-Florida district, headquartered in Jackson, Miss., has been transferred to Casper, Wyo., as district geologist for the Rocky Mountain area.

Foreign visitors at the November 16 meeting of Los Angeles Chapter of Nomads. Front row, left to right: Virgil Freel, Texas Petroleum Co., Colombia; G. H. Atkins, formerly with Iraq Petroleum Corp.; Jesse F. Roberts, Iraq Petroleum Corp., Qatar; C. T. Blanchat, Richmond Exploration Co., Venezuela; and L. E. Hess, Socony-Vacuum Oil Co., Inc., Colombia. Back row, left to right: Lee N. Bradley, Texas Petroleum Co., Colombia; Travis S. Coggan and Karl B. Jauman, Basrah Petroleum Co., Ltd., Iraq; Phil McConnell, Arabian American Oil Co., Arabia; S. L. Slaughter, Tropical Oil Co., Colombia; and Frank Walmsley, English Drilling Equipment Co., Ltd., London. O. H. Arnold, Socony-Vacuum Oil Co., Egypt; and T. A. Connor, Iraq Petroleum Corp., were not available when photograph was taken

A. Neil Lilley has been appointed general manager of foreign operations, Eastern Hemisphere, for The Texas Co. Lilley joined Texaco in 1933 and has since held various positions in the United States and abroad. From 1942 to 1945 he served with the U. S. Army Air Forces.

A. G. Anderson, general traffic manager for Socony-Vacuum Oil Co., Inc., has been elected vice president of National Industrial Traffic League, for a 2-year term.

Charles P. Watson, division land man for Sinclair Oil & Gas Co. in the Rocky Mountain area, has resigned and will turn independent, operating out of Casper. **Charles E. Titus,** Sinclair's district land man at Salt Lake City, has been named to take Watson's place at Casper.

Morgan Walker, New York consulting engineer, has been appointed consultant to Iraq Petroleum Co., Ltd., to succeed the late H. S. Austin. Walker, a graduate of Oklahoma A. & M. College, has served with Empire Gas & Fuel Co. of Bartlesville, Okla., U. S. Bureau of Mines, and Creole Petroleum Corp. In his job with the latter company he went to Venezuela as petroleum engineer in charge of construction of the first welded pipe line in eastern Venezuela. He was transferred to New York City as technical assistant to **Eugene Holman,** then in charge of Standard Oil Co. (N. J.) foreign operations. He joined the Bechtel Group in 1944 and became general manager of Venezuelan associate, Compania Bechtel.

MORGAN WALKER

Harry W. Reineke, Jr., associate petroleum engineer for Humble Oil & Refining Co., and formerly stationed at Houston and later at Westwego, La., is now supervising marine repairs, with headquarters at New Orleans.

Leo Sas, Carter Oil Co., has been elected president of the Montana scout check. Other officers are: **Leonard Scott,** Shell Oil Co., vice president; and **M. Johnson,** Amerada Petroleum Corp., secretary-treasurer. The check's headquarters have been moved from Lewiston to Billings.

Stanley G. Wissler, chief paleontologist for the Pacific Coast area, Union Oil Co. of California, is now serving as chief geologist for the area, in charge of geological exploration.

F. P. Hurry, senior geologist for Carter Oil Co. at Purcell, Okla., has been moved by the company to Wichita, Kans., where he is serving as assistant Kansas district geologist.

Harry R. Brough, engineer for Mountain Fuel Supply Co., Salt Lake City, was recently elected chairman of the newly organized Salt Lake chapter, National Association of Corrosion Engineers. **William Littreal,** Utah Oil Refining Co. engineer, was named first vice chairman; and **R. W. Vance,** Utah Power & Light Co., was named second vice chairman.

Roy P. Northern has been named district landman for Standard Oil Co. of Texas, succeeding **Frank L. Houghton, Jr.,** who resigned to become associated with **Pat H. Rutherford,** independent oil operator, in the Midland, Tex., office. Northern previously was assistant to **G. H. Stoddard,** division exploration superintendent in the Midland area. **Jack Gibson** has been moved to Midland as assistant to the division exploration superintendent.

Hugh A. West has been named division superintendent in West Texas and Southeast New Mexico for Atlantic Pipe Line Co., succeeding **J. L. McGrew,** who retired after 27 years of company service. West has been with the firm 21 years at Midland, Tex., and formerly was assistant division superintendent.

Charles M. Hartwell, production engineer at Odessa, Tex., for Cities Service Oil Co., has been moved by the company to Hobbs, N. M., where he is serving in a similar capacity.

C. R. Smith, Odessa, Tex., district production superintendent for Cities Service Oil Co., has been elected chairman of the Permian Basin chapter, American Petroleum Institute, division of production. He succeeds **W. D. Lane,** of Plymouth Oil Co., Midland, Tex. Other officers named include: **E. N. Spiars,** of Spiars & Wells Equipment Co., Odessa, retained as first vice chairman; **Roy E. Carter,** of Amon G. Carter Foundation, Kermit, Tex., second vice chairman; and **Jay A. Wooten,** Stanolind Oil & Gas Co., third vice chairman.

SHIFTS—

Dell C. Wade, engineer, Stanolind Oil & Gas Co., Rangely, Colo., to Refugio, Tex.; **W. W. Butler,** engineer, Ohio Oil Co., Byron to Casper, Wyo.; **M. P. Popp,** Ohio Oil Co., McFadden to Laramie, Wyo.; **Russ Williams,** superintendent, Exploration Drilling Co., Lander to Casper, Wyo.; **Gerlad Burgess,** superintendent, Ohio Oil Co., Powell to Casper, Wyo.; **Karl E. England,** engineer, Phillips Petroleum Co., Ardmore to Anadarko, Okla.

W. E. Adkins, engineer, Alberta Government Oil Sands Project, Bitumont, Alta., Canada, to Edmonton, Alta., Canada; **J. D. Turner,** engineer, Imperial Oil, Ltd., Calgary to Redwater, Alta., Canada; **Warren M. Henker,** geologist, Imperial Oil Co., Edmonton to Devon, Alta., Canada.

DEATHS

Cecil Bayne, 46, district manager of Arkansas-Louisiana Gas Co., Hot Springs, Ark., died November 21.

Herbert M. Ogg, 60, Houston independent oil operator, died November 18.

Frank J. Darby, 38, assistant production foreman for E. B. Hall & Co., Long Beach, Calif., died November 18.

Robert H. Eisenach, 28, Michigan district geologist for Pure Oil Co., Clare, Mich., was killed in an automobile accident November 19.

Emil Richard Albert, Sr., 68, Tulsa oil operator, and former partner in the Dunn Petroleum Corp., died November 24.

A. Hamilton Garner, 60, Dallas geologist, died November 25. He served as Brazilian representative of DeGolyer & MacNaughton, geological firm, until recently.

J. M. Flynn, 64, former chief gager for the old Prairie Pipe Line Co. at Wichita Falls, Tex., died November 23.

Grady Dennis, Breckenridge, Tex., operator at Phillips Oil Co. refinery, died November 27.

Allen Whiteside, 55, Tulsa, who retired as executive assistant to the president and a director of Sinclair Prairie Oil Co. in 1940, died November 29.

Walter J. Herr, 63, for 25 years division manager for Mid-Continent Petroleum Corp. at Chicago, until his retirement in 1945, died November 26.

Esso Operates

WORLD'S LARGEST FLUID CATALYTIC CRACKING UNIT

by George Weber
Refining Editor

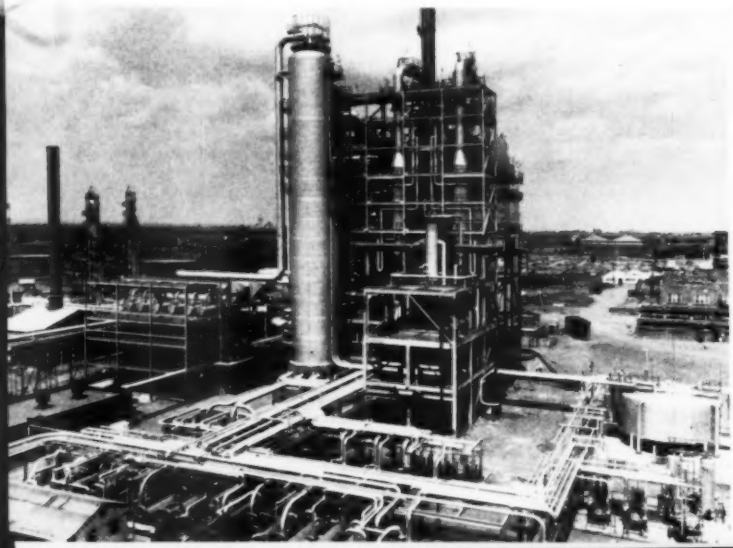
COMPLETION of a major 2-year expansion program was marked recently when Esso Standard Oil Co. placed the world's largest fluid catalytic cracking unit on stream at its Bayway refinery, Linden, N. J. The giant plant, with a design capacity of 41,000 bbl. daily, incorporates a number of new design features.

Operating on 36,000 bbl. of fresh feed and 5,000 bbl. of cycle stock, the fluid cat unit's output per stream day will approximate 23,400 bbl. of gasoline, 5,900 bbl. of heating oil, and 6,500 bbl. of other products, including residual fuel, dry gas, L.P.G., and feed stocks for alcohol, polymerization, and alkylation plants at the refinery.

Together with a 49,000-bbl. vacuum pipe still completed last summer, the fluid with light-ends-recovery facilities will increase the production of gasoline and heating oils roughly 25 per cent with little or no increase in the refinery's crude-charging rate of 140,000 bbl. daily. Bayway's overall daily capacity now totals 57,000 bbl. of gasoline and 24,000 bbl. of heating oil. This increase in capacity for producing the higher-valued distillate products accompanies a corresponding reduction in the minimum yield of residual products.

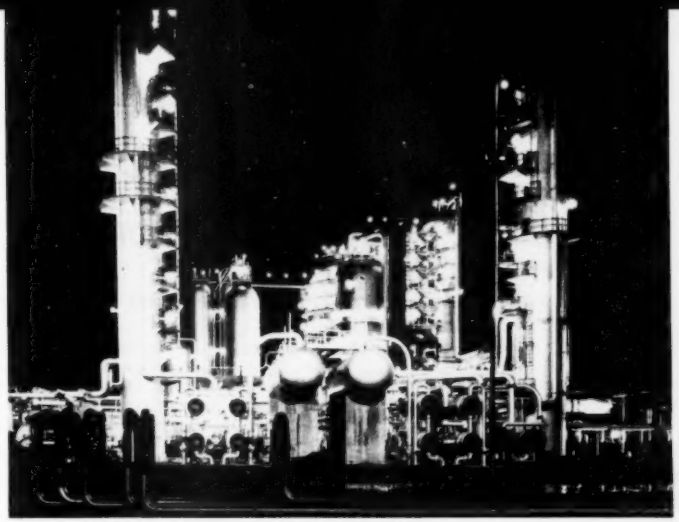
The 49,000 - bbl. - per - day vacuum pipe still charges a reduced crude 830 F. true-boiling-point cut from existing atmospheric units, to produce feed stock for the fluid unit. Crude is further reduced to a bottoms fraction with an 1,100 F. true-boiling-point cut, and then thermally visbroken at the refinery.

The new fluid unit is noted for its simplicity of design. With double the capacity of the original fluid unit at Bayway, it reaches a height of only 165 ft. as compared with 235 ft. for the older cat cracker. Reactor and regenerator are installed at about the same level, and the 130-ft. primary fractionation tower dominates the unit. Visible at the left are two catalyst storage vessels. From the 35-ft.-diameter reactor, center, cracked oil vapors are charged to the 20-ft.-diameter primary fractionator, right, from which are withdrawn product streams of gas, naphtha distillate, heating oil, light gas oil, and heavy gas oil



Left: This view of the 41,000-bbl. fluid unit shows light-ends facilities at the left. On the cracking unit, flue gases from the regenerator, part of which is visible at the right edge of the structure, pass overhead in two 52-in. lines to twin waste-heat boilers which generate 80,000 lb. hourly of 150-psi. steam. Before leaving the regenerator, flue gases pass multiple-stage cyclone collectors which separate catalyst with sufficient efficiency to make installation of electrical precipitators unnecessary

Integration of the two new process units into refinery operations required additional steam and power generating facilities and an expansion of the plant's cooling-water system. A new 265,000 - lb. - per - hour high-pressure steam boiler and a 7,500-kva. turbo-generator meet added refinery demands. A new 60-in. salt-water line with a capacity of 120,000,000 gal.

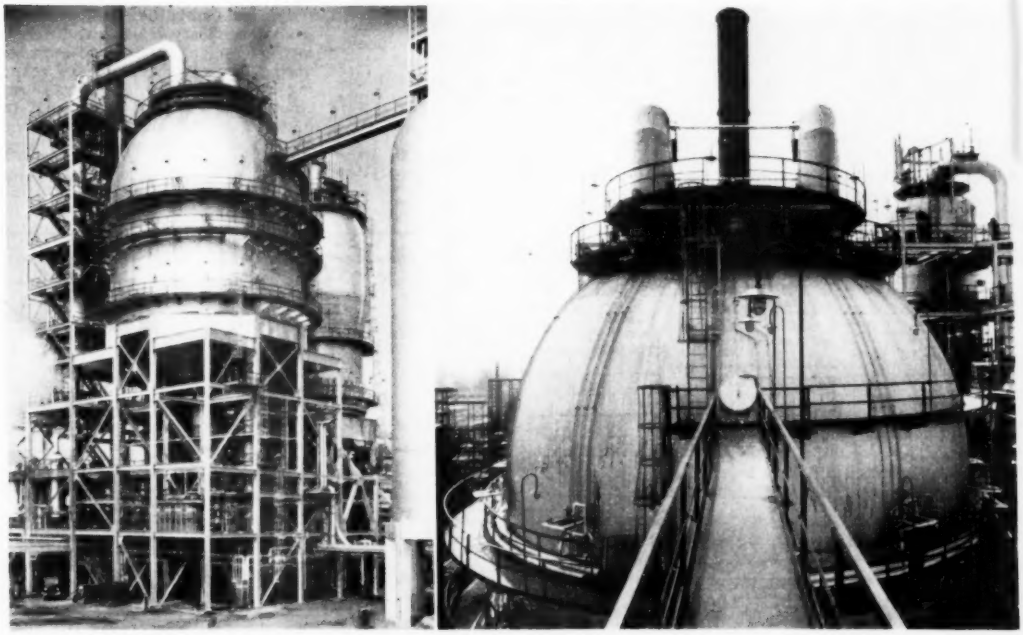


The light ends unit is designed to handle per stream day, 33,200 M.c.f. of gas and 14,800 bbl. of naphtha distillate from the fluid unit's primary fractionator. Two multi-stage centrifugal gas compressors, each with a capacity of 12,300 cu. ft. per minute, driven by 3,300-hp. steam turbines, transfer the gas cut from the fractionator to the light-ends unit. This is the first such application of centrifugal units in compressing refinery gases containing water vapor and corrosive compounds at high compression ratios. Their use in place of reciprocating units reduced plant size and cost and is expected to result in smoother control and improved plant service factor. By means of absorption and fractionation, incoming streams to the light-ends unit are separated into fuel gas, a propane-butane cut, and two high-octane naphtha cuts. The C-C, cut is employed as feed for alcohol manufacture and for conversion into high-octane polymer

daily will care for the increased cooling requirements. Effluent streams of cooling water from the cat cracker and vacuum unit are handled in new 60 and 30-in. sewer lines discharging to the refinery's sewage-distribution facilities. Offsite process and utility tieins required to serve the new units totaled nearly 30 miles of lines.

The affiliated Standard Oil Development Co. completed design and equipment specifications for the cracking unit. Both the vacuum pipe still and the fluid cat cracker were constructed by C. F. Braun & Co. All offsite construction work including new steam and power facilities, process lines, and cooling water and sewer facilities, was performed by Esso construction forces at the refinery.

***Left:** Apart from its size, the new fluid unit has a number of design improvements. The side-by-side installation of reactor and regenerator and the use of long-radius bends for large-diameter piping materially reduced expansion-joint requirements. Catalyst-carrying lines employ only two simple rotation joints in place of multiple expansion joints. This view of the unit features the regenerator. Some conception of size is seen in the spent-catalyst riser, measuring 105 in. in. diameter. This transfer line carrying air and spent catalyst, rises in a long streamlined curve from ground level to the apex of the regenerator bottom cone. **Right:** The regenerator, largest ever fabricated, measures 55 ft. in diameter. It comprises a 20-ft. cylindrical section with a hemispherical head and cone bottom, insulated with a new type of monolithic lining. Dense bed cooling coils and catalyst distributors are not required, and with the exception of a perforated grid located at the bottom of the cylindrical section, the vessel has no internals in the combustion zone. The only internals in the dilute phase consist of three stages of cyclone collectors located in the top of the hemispherical head. This view, taken from catalyst storage, shows the twin flue gas lines leading to waste-heat boilers*



Equipment Selection . . .

FOR WATER-FLOOD PUMPING

by J. H. Field* and E. N. Kemler†

ECONOMIC factors in secondary-recovery operations are usually quite critical so that the last item in the development is cut to the irreducible minimum. The selection of pumping equipment is therefore generally not given proper consideration. Since the production costs are so critically tied up with maintenance expense and determine the life of the flood, the selection of pumping equipment and its operation conditions are much more important than generally considered.

Pumping Requirements

The loads on pumping equipment for a primary gas-expansion type of reservoir are generally at a maximum at the time of flush production and decrease with pool depletion. Since high fluid levels and gas coming out of solution reduce pumping requirements in early life of the well, the selection of equipment for this type of reservoir is usually not too difficult. In a primary water-drive-type reservoir, the load on the equipment is large soon after the well is put to pumping and decreases until water appears.

The limiting factor at the economic life is generally the cost of maintenance of the surface and subsurface equipment under the heavy pumping conditions. The selection of pumping equipment for this type of reservoir is difficult because of the inability to predict reservoir performance.

In water-flooding operations, the loads on pumping equipment are small at first because of the small production, usually all oil. Once oil production increases, it continues to increase until water enters the well bore in large quantities. This is indicated in Fig. 1, which shows a typical production curve for oil and water. The maximum production and load on the equipment for most wells occurs within a short time after the peak oil production, and continues near maximum until abandonment. Water production gradually increases until the economic limit is reached, usually when the well is producing only 2 or 3 bbl. of oil daily.

One important characteristic of water-flooding operation is that the load placed on the oil-well pumping equipment is regulated by the rate of water injected in the input wells. The amount of fluid to be produced is equal to the amount of injected water, and is controlled by such factors as sand thickness, permeability of the producing sand, well spacing, and injection pressure.

Selecting the Pumping Unit

With pumping conditions rather well established, and with a knowledge that there will be practically no gas produced with the fluid, maximum load imposed on a conventional pumping unit may be estimated by the following formula:

$$P = (W_r + W_o)\left[1 + \frac{SPM \times S}{5{,}400}\right] (L)$$

Where:

W_r = Weight of rods per foot, neglecting buoyancy
W_o = Weight of oil column on plunger per foot = $(0.34\ D^2)$
SPM = Strokes per minute
S = Length of stroke, in.
L = Depth of well, ft.
D = Diameter of plunger, in.
P = Maximum well load, lb.

The torque to be carried by the unit depends on the amount of load which can be counterbalanced. This in turn is dependent on the pumping cycle which determines the shape of the dynamometer card. The torque rating required of the unit further depends on the attention given in the field to putting the well in proper counterbalance.

For small units, the difference between good balance and normal field practice may require as much as 50 to 100 per cent difference in peak torque requirement. In the absence of specific information, an arbitrary basis frequently used is to assume 60 per cent of the peak load counterbalanced. This would give a peak torque of: $P = 0.4P \times S/2$. In using this relation, it should be recognized that it is an arbitrary relation and may be too low when improper counterbalancing is used or for unusual pumping cycles. It may also imply purchase of too large a unit where the pumping cycle and counterbalance conditions are carefully considered and applied.

Example.—Consider a well 1,500 ft.

*Head, mechanical engineering section, Sohio Petroleum Co., Oklahoma City. †Associate director, Southwest Research Institute, Houston. Summarization of paper presented at petroleum mechanical engineering conference, A.S.M.E., Oklahoma City.

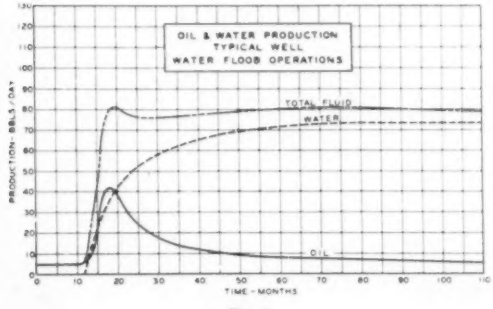


Fig. 1

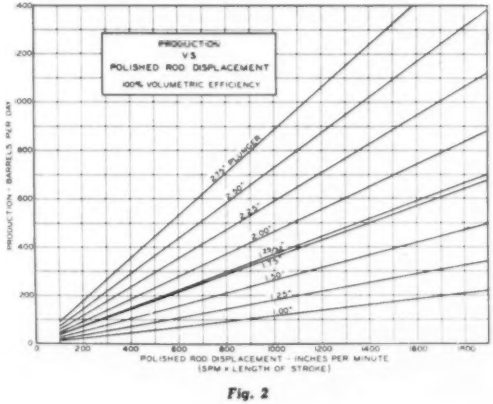


Fig. 2

deep to produce 200 bbl. per day, pump efficiency 80 per cent, using a 1-25/32-in. common barrel in 2-in. tubing, and a 22-in. stroke. Since the pump is only 80 per cent efficient, a theoretical production of 250 bbl. per day will be needed. Use a sucker-rod weight of 1.12 lb. per ft. From Fig. 2, the polished-rod displacement will have to be 660 in. per minute.

$$P = [(1{,}500 \times 1.12) + (1{,}500 \times .34 \times [1\text{-}25/32]^2)] [1 + 660/5{,}400] = 3{,}700 \text{ lb.}$$

$$T = .4 \times 3{,}700 \times 22/2 = 16{,}200 \text{ in. lb.}$$

The 660 polished-rod displacement would require a pumping speed of 30 s.p.m. This speed is entirely too fast, using a wire-line hanger, and difficulty can be expected from the rods leaving the pumping unit carrier bar on the downstroke. For shallow-well operation, 25 s.p.m. is about the maximum speed a pumping unit can be operated without difficulty being experienced.

Under certain conditions of daily production and well depth, many conventional pumping units would be required to operate at excessive well strokes per minute. For production of 100 bbl. per day or less this is not a problem. It was mentioned in the example cited that a common-barrel pump was included. Should a rod-insert-type pump be used with the same size tubing, necessitating a smaller bore pump, the problem of fast pumping speeds becomes more acute.

It would appear desirable to have a unit with longer stroke than is now commonly available so as to reduce pumping speeds. Assume a 30-in. stroke were available; the unit in this case could be operated at 22 s.p.m. to obtain the desired production. The peak torque on the unit would become:

$$T = .4 \times 3{,}700 \times 30/2 = 22{,}200 \text{ in. lb.}$$

Maximum polished-rod load would be unaffected. Thus, it may be practical to use the same pumping unit structure with larger gear units to satisfy the well-load conditions and at the same time hold investment to a minimum. High pumping speeds may also lead to high pump repair costs, as will later be pointed out.

It may be of interest to note in Table 1 that for any given depth between 500 and 2,000 ft. any change in production has little effect on maximum polished-rod load and torque, less than 10 per cent from 100 to 250 bbl. per day when using the same bore pump. Well load is increased four-fold when comparing 500-ft. lift with 2,000-ft. lift for same production, and peak torque is increased six times, based on the 40 per cent of peak load value.

Selection of Sucker Rods

The main points to consider in any sucker rod application are: (1) peak load, and (2) corrosive condition of the fluid.

As previously shown, the peak load to be imposed on the rod string is mainly dependent on the depth of well and amount of fluid to be produced daily. But for wells 2,500 ft. deep or less, producing not more than 250 bbl. per day total fluid, a ⅝-in. diameter sucker rod will handle the maximum load to be expected.

Handling of peak loads with sucker rods is no problem, but the corrosion problem is of major importance. All water entering a producing well is corrosive to some degree, and the degree of corrosiveness of fluid pumped must be carefully considered. The degree of corrosiveness of the injected water can be controlled by proper water treatment.

The best type sucker rod to be used under the various corrosive conditions can only be determined by field experimentation. However, a carbon steel rod which has the following properties, has operated in many floods without excessive failure.

PHYSICAL PROPERTIES

Yield (psi.)	60,000
Ultimate (psi.)	90,000
Per cent elongation, 8 in.	20
Per cent reduction area	50
Brinell hardness	190

CHEMICAL PROPERTIES

Carbon	.40
Manganese	.85
Phosphorus, max.	.04
Sulfur, max.	.05
Silicon	.22
Nickel	Resid.
Chromium	Resid.

This is the most economical rod on the market for light service and will operate satisfactorily under conditions of mild corrosion.

Although calculations indicate that a ⅝-in. rod is sufficiently strong to handle the maximum polished-rod load, any severe corrosion reduces the area of the rod and stresses may be sufficiently high to cause rod failure. Consequently, operators at times use ¾-in. rods to lessen the chance for failure should corrosion take place. If hydrogen sulfide is the main corroding agent, a nickel molybdenum (4621) rod may be required.

There is so little difference in cost between the ¾-in. rod and the ⅝-in. rod that total investment is increased very slightly by installing the larger rod. For a 2,000-ft. well, the larger rods would cost approximately $100 more per rod string. This is equivalent to the cost of two pulling jobs and the added investment may be paid out several times over in reduction of pulling expense. Another advantage of the larger rods is apparent where 2½-in. tubing is used. The ¾-in. rods will not flex as much and will not have a tendency to wear in the body as a result of flexing as would ⅝-in. rods. Also should the rod string fail, the larger rods would have less tendency to become damaged by falling.

In shallow wells producing at high rates, larger rods have another advantage. Their weight increases the velocity of fall on the downstroke. This indicates that faster pumping speeds may be employed than with ⅝-in. rods, for the polished-rod clamp would have less tendency to leave the carrier bar. If the rods are not supported by the carrier bar on the downstroke, then the carrier bar picks up the full weight during pump upstroke, and high impact loads are imparted to rod strings which will lead to rod failure.

The number of sucker-rod load reversals is an important factor, especially where rods have been corroded or worn. The greater the pumping speed, the greater the number of stress reversals per day and the sooner rod failure would be expected to occur.

The endurance limit of rods is much less in a corrosive fluid than in a noncorrosive fluid because of the embrittlement of the steel. This applies mainly to wells producing hydrogen sulfide.

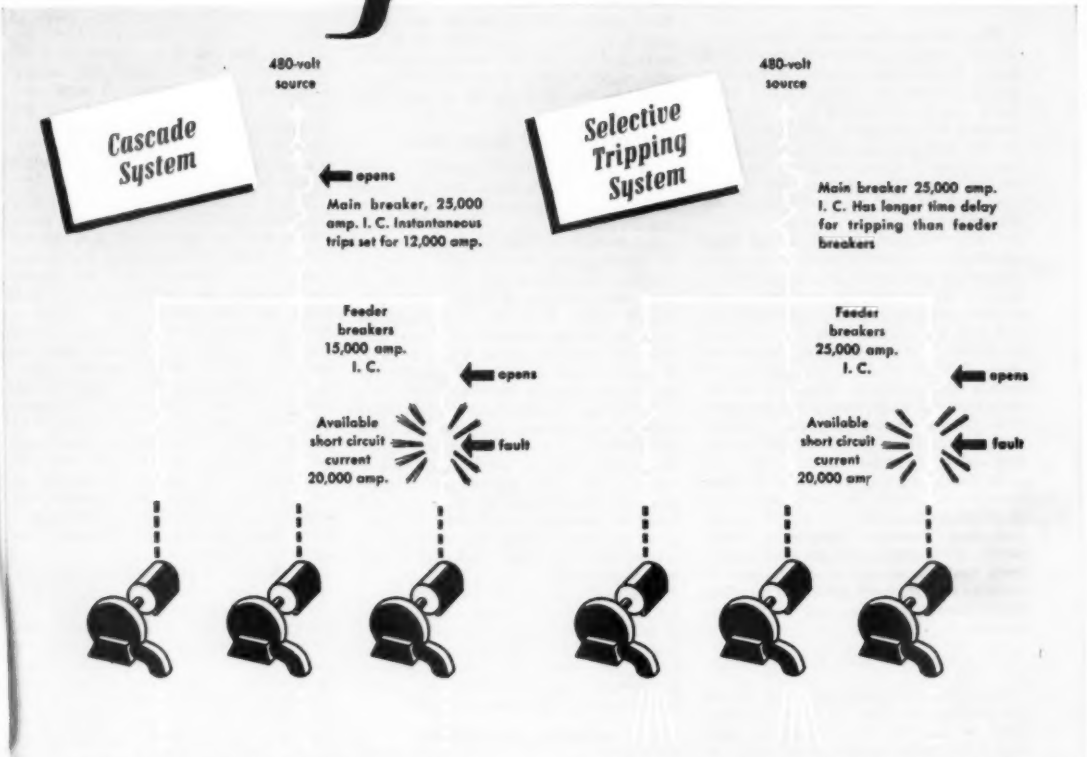
Produced fluid frequently contains sand which may lodge in the pump between the plunger and the barrel, causing sticking of the plunger. A stuck plunger may result in sucker rod stress sufficient to cause a high

TABLE 1—CALCULATION PUMPING UNIT REQUIREMENTS FOR 1-25/32-IN. BORE PUMP—80 PER CENT EFFICIENCY

Barrels fluid per day	Depth to fluid	Peak load (lb.)	Peak torque in lb.	Max. length stroke available* (in.)	Inches per min. plunger travel	Necessary s.p.m. to obtain production
100	500	1,170	3,740	16	340	21.2
	1,000	2,340	9,350	20	340	20.0
	1,500	3,500	15,400	22	340	15.5
	2,000	4,670	26,100	28	340	12.2
150	500	1,200	3,840	16	510	†31.9
	1,000	2,400	9,600	20	510	25.5
	1,500	3,600	15,800	22	510	23.2
	2,000	4,810	26,900	28	510	18.2
200	500	1,230	3,940	16	660	†41.3
	1,000	2,480	9,900	20	660	†33.0
	1,500	3,700	16,200	22	660	†30.0
	2,000	4,950	27,700	28	660	23.6
250	500	1,270	4,060	16	850	†53.0
	1,000	2,540	10,100	20	850	†42.5
	1,500	3,820	16,800	22	850	†38.6
	2,000	5,090	28,600	28	850	†30.4

*For pumping unit that has required beam load and torque rating. †Considered to be too fast a pumping speed for good operation.

What's the trend in refinery electrification? } ...better


Cascade System
480-volt source
opens
Main breaker, 25,000 amp. I. C. Instantaneous trips set for 12,000 amp.
Feeder breakers 15,000 amp. I. C.
opens
Available short circuit current 20,000 amp.
fault
Selective Tripping System
480-volt source
Main breaker 25,000 amp. I. C. Has longer time delay for tripping than feeder breakers
Feeder breakers 25,000 amp. I. C.
opens
Available short circuit current 20,000 amp
fault

Cascade system is used where service continuity is not a "must." Here the main air circuit breaker is used to assist the feeder breaker to interrupt all faults over 80 per cent of feeder breaker's capacity. Lesser fault currents are interrupted by the feeder breaker alone.

Selective tripping system lets feeder air circuit breakers interrupt *all* fault currents on feeders. Main air circuit breaker opens only for bus faults or because of failure of feeder breaker. Thus, a short circuit in one feeder does not interrupt power to other feeders.

Here's what you need to modernize your power system! }

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protection against shutdowns

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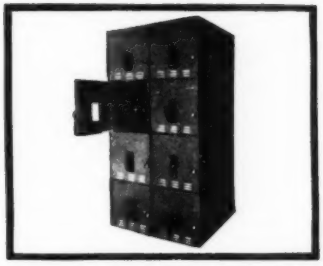
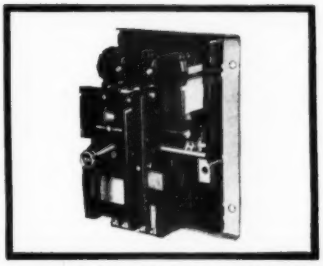


G-E metal-enclosed switchgear, containing air circuit breakers with new trip device, needs less floor space. Features include new rack-out mechanism, improved bus construction.



In the G-E Type AK-1 air circuit breaker (shown here with one trip device removed) you get improved arc interruption, multiple arcing contacts, and interchangeable trip units.

New G-E Type EC-1 tripping device for AK-1 air circuit breakers is sealed to eliminate maintenance, easily adjusted, readily removable for changing trip characteristics.

GENERAL ELECTRIC

661-6

concentration of stresses around a corrosion pit in the body of the rod that may eventually lead to rod failure, which is another reason for ¾-in. rods in areas where stuck plungers is a problem.

Subsurface Pump Selection

Dissimilar metals in a pump in the presence of salt water will set up localized electrolysis, leading to corrosion and erosion of pump parts. This is more true in water flooding than in primary operations, probably because of the volume and chemical content of the water handled. To retard pump corrosion, many different metals have been tried, including stainless steels, nickel steels, Monel metal, etc. Nickel steels appear to be satisfactory where oxygen is the chief corroding agent.

In one large water-flood project, an analysis of subsurface difficulties over a period of 2 months indicated the following reasons for pulling:

Reasons for pulling—	Per cent of total jobs
Pumps	72
Rods	17
Tubing	11
Total	100

Of the 72 per cent of pulling jobs for pumps, 32 per cent were attributed to failure of balls and seats.

Failure of balls and seats in turn is attributed primarily to hammering out of seats by the balls under repeated pounding, and corrosion of the valves. Hammering out of the valves is a function of the bore of the pump. By increasing the bore of pump, the pump strokes per minute can be reduced, and by reducing speed of pumping, the valves should remain in operation longer before pounding out. Therefore, as large a bore pump should be used that will not overload the pumping unit.

There is always the question of whether to use rod-insert pumps or tubing pumps. A limitation on the rod-insert pump is the maximum bore pump that can be used in any given size tubing. In most water flood projects, 2-in. tubing is run which limits the insert-type of pump to a 1½-in. bore. The greatest production that could be expected with this bore is 160 bbl. per day unless an oversized pumping unit with long stroke is installed. An important advantage of the insert-type pump lies in the fact that the pump can be pulled if the plunger becomes stuck without pulling the tubing.

Liners may be used in tubing pumps, but this requires pulling of the tubing to repair the pump which is an added expense. Liner pumps in general have the advantage in that different types of metal may be used in liner construction, which affords an opportunity to determine the best metal to withstand corrosion and wear.

The cup-type pump is perhaps more affected by abrasive material than any other type, as the cups cut out and therefore, in wells producing sand or products of corrosion, the cup pump is not entirely satisfactory.

Since liner-type pumps are desirable from the standpoint of utilizing various metals in the liners, and since rod pumps are a definite advantage, and the reason more rod pumps aren't used in the larger floods is because of the limitation in amount of production that can be handled, it appears desirable to use 2½-in. rather than 2-in. tubing in water-flooding operations when individual well production is above 150 bbl. per day. By using larger tubing, a rod-insert pump can be run up to 1¾-in. bore without the polished-rod load being any greater than for the largest size common-barrel pump with 2-in. tubing.

The difference in cost between a 2½-in. and 2-in. tubing string for a 2,000-ft. well is less than $275 and the saving in well-pulling expense, where large-bore pumps are required, can more than offset additional cost of the larger tubing. For a 2,000-ft. well, the cost of pulling the tubing may amount to $50 per pump pulled. Also, frequent round trips with the tubing will wear the threads on the tubing to the extent that difficulty with leaky threads can be expected. Thus, if tubing is purchased, due consideration should be given to the tubing diameter for water-flooding operations.

Pump clearance, that is, the fit of a pump, is not an important factor in secondary-recovery operations, insofar as slippage is concerned. However, too tight a fit will lead to stuck plungers. The material sticking the pump is often believed to be products of corrosion that have settled from the inside of the tubing, such as when a well is temporarily shut down. Where the fluid pumped is mostly all water, there is little lubrication and clearance must be increased to reduce friction and heat developed that often leads to stuck plungers.

Valves pound out because material is too soft and a material with a greater hardness should be tried. If balls or seats crack, this is often an indication of improper heat treatment. If a valve seat is fluid cut on diametrically opposite sides of the seat, this is an indication that the valve seat was deformed when placed in a pump by tightening the cage on the seat frame. Flat-type seats have been found to have less tendency to deform than rib-type.

Electrical Equipment Selection

Selecting the correct-size electric motor for a given installation may be based on performance of electric motors on other properties. Fig. 3 shows electrical energy consumed per barrel of fluid lifted, which is a composite curve based on many wells pumping at various depths. To use the curve, the depth to the pump must be known. For instance, suppose in selecting a motor for a well the depth to the pump is 1,500 ft. and total fluid to be lifted amounts to 200 bbl. per day. Referring to the curve, it is noted that it will require 0.5 kw.-hr. per barrel of fluid lifted.

$.5 \times 200 = 100$ kw.-hr. required daily.

Divide this by hours pumped daily to obtain the kilowatt load on the motor:

$100/24 = 4.2$ kw. average load on motor

Multiply 4.2×1.34 to convert to horsepower, or 5.6 hp.

The next larger standard motor would be used, which is 7½ hp. Motors for automatic operation should have ample capacity to take care of starting torque, especially during cold weather.

The motor load can also be determined by calculating the hydraulic horsepower and using an over-all pumping efficiency of 40 per cent.

$$\text{Hydraulic horsepower} = \frac{B \times L \times W}{33{,}000 \times 60 \times H}$$

$$= \frac{200 \times 1{,}500 \times 350}{33{,}000 \times 60 \times 24}$$

$$= 2.2 \text{ hp.}$$

$$\text{Motor load} = \frac{2.2}{.40} = 5.5 \text{ hp.}$$

Where:

B = Barrels produced
L = Depth to fluid
W = Weight per barrel fluid (water)
H = Hours produced daily

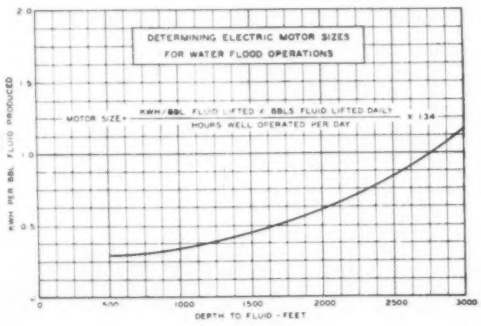


Fig. 3

It should be remembered that there is no relation of horsepower requirements of the prime mover to peak load and peak torque which was the basis for pumping unit selection.

The motor selected should be the one that will be necessary to lift the maximum daily fluid from the well during the life of the flood. At first the motor will be only partially loaded, but it is considered more economical to install a large motor at the start rather than put on a small motor and keep changing motors with increase in load. If motors be changed, it would likely require the purchase of two motors for every well, with the additional expense of changing out the motor and control box.

In designing an electrical distribution system, one of the most important features is the amount of voltage drop to the farthest well. Too low voltage will cause the end motor to kick out when other motors are being started. Voltage losses require considerable computation, unless charts are available which serve as a short-cut method, and even then it requires a trial-and-error method for various size wires to select the most economical design.

Weatherproof wire can be installed on three-spool racks with 8-in. spacing, whereas bare wire should be separated by at least 14 in. on individual spools and clevises, which is more costly construction.

One disadvantage of weatherproof wire is its cost, which ranges from 10 to 40 per cent more than for corresponding bare wire. However, cost of the conductor is less than a third of the cost of the electrical distribution system, and the difference between cost of weatherproof and bare wire will likely be in the neighborhood of only 5 per cent of the total cost of the distribution system, and therefore cost is not too important a factor.

Frequently it is desirable to have an approximation of the cost of electrical distribution systems for preliminary investigations. A figure of $0.50 per foot installed for three-phase systems should prove fairly reliable, but does not include the cost of transformer banks.

Entering into the cost of the distribution system is the pole spacing. Certain types of conductors may be run 350 ft. between poles. With 10-acre well spacing, or 660 ft. between locations, two 330-ft. spans could be used. However, if hard-drawn or medium-hard-drawn copper wire be used, this spacing is too great and the sag would be too much unless high poles are used. A number of companies are using hard drawn wire from 165-ft. spacing.

In general, poles for oil-field installations are 30-ft. creosoted with 35-ft. poles for highway crossings and different lengths of poles for unusual ground contours.

Utility companies generally have a clause in their rate schedule which states that a penalty must be paid if power factor of the system is less than .80. If power demand is small, the utilities may overlook the penalty, but if demand is high, say over 400 hp., the penalty is applied. Wherever a penalty must be paid, the installation of capacitors pays out within a few years and improves electrical operating conditions.

For secondary-recovery operations, the location of capacitors would normally be at the electrical distribution system junction of a group of wells. Capacitors of 15 kva. have been found to be an ideal size, and can be adapted to other areas later. Larger capacitors do not have the same flexibility of application. Small capacitors placed at individual wells are usually not desirable because of the higher cost.

Some floods are definitely affected by short interruptions when power service fails. This is reflected in oil production and it may require several days to regain daily oil rate after a few hours shutdown. In order to minimize shutdown time, time-delay relay switches are installed. The capacity of the electrical system is not sufficient to pick up the entire field load at one time; therefore, groups of wells are started on staggered schedule with one group starting a few seconds after the previous group. This is automatic, and to start each well individually might take hours. Also, plant operation may be automatic when electric motors are used for water injection.

Several Rate Schedules

Each electrical utility has several rate schedules which may be applicable to flooding operations. Total plant load may be low when electrical energy is first purchased, and the utility rate schedule applicable then may not be the one that is to the operator's advantage when the peak of the flood has been reached.

In purchasing electrical energy, an important step is to determine the type of connection used at the transformer banks serving the property. If it is a Y-delta or delta-Y, then special precautions have to be taken to prevent motor burnout. If one phase in a three-phase system is out, the motors will run on single phase and the current drawn when operating in this manner will be abnormally high and may lead to burnout of the motors. A delta-delta transformer bank is more desirable.

Transformer banks, if owned by the operator, are generally single-phase because of (1) easily obtained, (2) small unit weight and easily handled, (3) when one phase is out, the system can in some instances be operated by two transformers by reconnection.

Following is an example of installation costs of electrical equipment at the well which may prove helpful in planning electrical operation:

APPROXIMATE WELL COSTS—ELECTRICAL EQUIPMENT

	3 hp.	5 hp.	7½ hp.	10 hp.
Motor—1,200 r.p.m.	$115	$150	$200	$230
Motor controls	110	110	110	175
Installation expense at well	75	75	75	75
Total	$300	$335	$385	$480

Triple-rated motors have been used, but it is believed that in water-flood operations the short interval of time between installation of the motors and when maximum well load is reached makes triple-rated motors of little advantage, the disadvantage being higher investment.

Electrical operation is ideal for part-time pumping as the wells can be operated on various pumping schedules to determine the schedule giving maximum production. Also, where there is a large number of wells in operation, staggering of pumping schedules may lead to a substantial decrease in electrical demand with resultant decrease in over-all electrical charges. An important consideration is to shut a well down that has pumped completely off so as to reduce power costs. Controlled part-time pumping has decreased electrical energy costs as much as 25 per cent for one operator.

BOOKS

BORON TRIFLUORIDE AND ITS DERIVATIVES. By Harold Simmons Booth and Donald Ray Martin. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. 315 pp. $5.

Research on applications of boron trifluoride and its complexes has resulted in a rapid expansion of knowledge in the field, and the development of many applications. This book presents information to facilitate investigations made with boron trifluoride. The material has particular value for research chemists in the petroleum industry, the plastics and polymer industry, for organic chemists interested in condensation and polymerization reactions in which boron trifluoride is used as a catalyst, and for chemists in the electroplating industry, the steel industry, and ceramics.

LABORATORY FRACTIONAL DISTILLATION. By Thomas P. Carney. Published by the MacMillan Co., 60 Fifth Avenue, New York. 259 pp. $5.75.

A guide for laboratory and research personnel, this book brings together important information on the theory, techniques, and equipment of laboratory fractional distillation. It provides a working knowledge of the use and limitations of fractional distillation in the preparation of pure compounds, the analyses of complex mixtures, and the preliminary study of distillation theories and processes. Of particular interest is the information on equipment. All columns in general use are described, analyzed, and compared. In addition there is detailed information on all accessory equipment needed for testing and operating columns at any given temperature and pressure, such as vacuum pumps, pressure gages, and fraction cutters. Suggestions are made as to the use of specific equipment for specific problems. The examples of the use of derived mathematical formulas will also be helpful. These show each step in the solution of problems such as the analysis of a particular column operation, the prediction of operating efficiency, or the design of a column.

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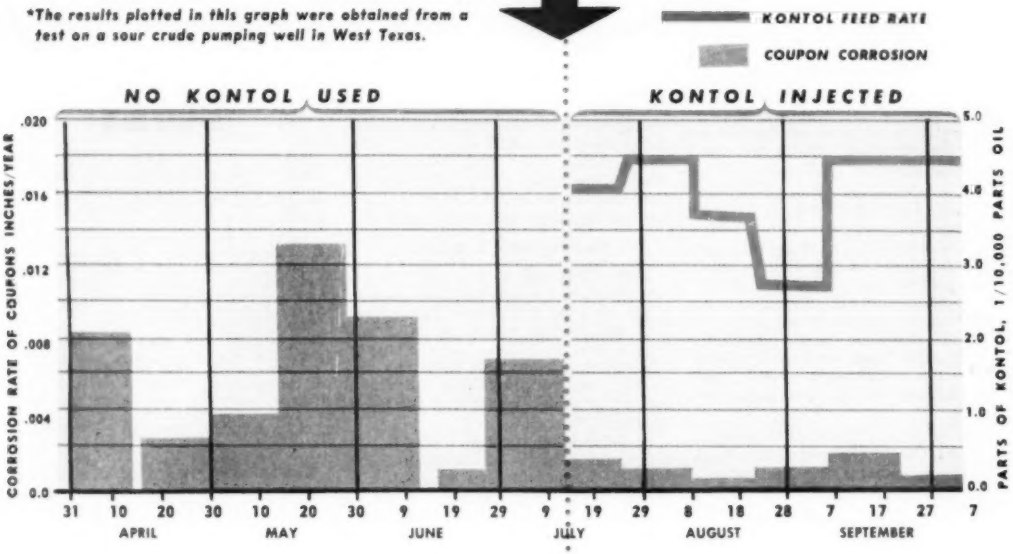
*The results plotted in this graph were obtained from a test on a sour crude pumping well in West Texas.



For informative literature, further information and particulars on the Kontol Rate of Corrosion Test Service, write or call

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KONTOL

CORROSION PREVENTIVES

KG-49-4

Factors to Consider in

SELECTING MUD PUMPS

by H. L. Willke

Data have been developed to the point where pump horsepower requirements can be anticipated and proper pump sizes selected to obtain maximum performance. Because the advantage of higher annulus velocity and greater jetting at the bit nozzles are being recognized, higher hydraulic circulating power is required. Higher - powered lighter - weight pumps, and parallel and series operations are available for these conditions. Pump designs must be well balanced and ratings and applications made with some conservatism to give satisfactory life under the widely varying load conditions encountered in drilling. The author is chief engineer for National Supply Co., Toledo. This paper was presented at the A.S.M.E. petroleum engineering conference, Oklahoma City.

AS the development of larger drilling rigs proceeds and deeper drilling is encountered, the slush pump is taking on a greater and greater degree of importance. Unfortunately, the very thing that gave steam pumps their unlimited mechanical capacity became their economical limitation. As competition in the oil industry became keener, the high cost of steam generation and water problems caused the use of steam rigs and pumps to become more and more prohibitive depending upon local conditions.

It has now become necessary for engineering staffs of operators and manufacturers to learn more about the functions of the pump related to drilling and to properly apply the capacity available.

Recent contributions to the knowledge of mud - flow characteristics have been made by Beck, Nuss and Dunn[5] and also by Nolley, Cannon, and Ragland.[6] The former have developed a theoretical formula for computing slush-pump pressures and the latter have compiled field test data including jet bit pressures and penetration rates.

Selection of Pump Size

It must be admitted that the rig horsepower has too frequently been the determining factor for the selection of a pump size. For hard - formation drilling the horsepower requirements for satisfactory hoisting and for circulating and rotating were near enough alike that rigs proportioned for adequate hoisting capacity had sufficient pump capacity. In softer formations, however, independently driven pumps have had to be added to take advantage of the higher penetrating rates possible.

To make a proper pump selection the hole size and drill-pipe size and type must be known for the most difficult holes contemplated for a rig.

Fig. 1 illustrates this problem in connection with a 20,000-ft. well in which it is possible to set 7-in. o.d. casing at 20,000 ft. The 7-in. o.d. casing would not necessarily be set as an oil string, but would be held in reserve for an emergency. This requires that 9⅝-in. casing be carried as deep as possible. In this example it is assumed that the 9⅝-in. will be set at 15,000 ft. requiring a 12¼-in hole to this depth.

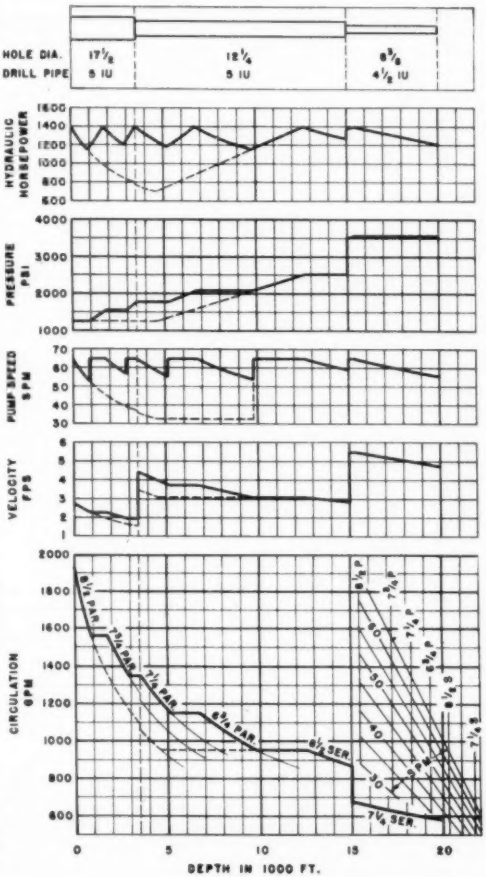


Fig. 1—Mud-pump performance versus well depth. For large flow rates, pressure varies as the 1.5 power of the circulated volume

Using flow-of-slush data for 5-in. o.d. drill pipe it is found that 1,400 hydraulic horsepower pump capacity is required to maintain 3-ft. per second annulus velocity in the 12¼-in. hole. Three feet per second has been expressed as a minimum desirable annulus velocity and even with jet bits maximum penetrating rates are obtained with higher velocities.[8]

Special attention to weight requirements and new and novel bearing applications have made possible the building of power slush pumps capable of performing the requirements of 20,000-ft. drilling. These pumps are well within the transportation limitations of modern hauling equipment.

At least two large power pumps of sufficient capacity are available. To obtain maximum drilling rates even these must be used in multiples. In Fig. 1 it can be seen that under large-volume low-pressure top-hole conditions parallel operation is required for 10,000 ft. Beyond this point the pumps can either be operated in parallel with very small liners or preferably in series with large liners.

Series operation of power pumps has now been proved to be practical, mechanically, but its application is not yet widespread due to the lack of experience and the cost and availability of adequate air chambers essential to all but very low-speed operation. These factors are not prohibitive where large pump requirements are involved and it is expected that with further developments, series operation will become popular in medium pump requirements.

The principal advantages of multiple pump operation are, first, greater versatility in a two-pump arrangement and, second, improved fluid-end-parts life.

In multiple pump operation the pumps are used in parallel under top-hole large-volume conditions and in series during the high-pressure drilling of a well. This makes possible a considerable reduction in the number of liner and piston sizes, resulting in lower inventories than would be required for a single-pump operation. Also for a single pump to accomplish the same volumetric displacement, the fluid end would have to be of considerably larger proportions.

While in series each pump handles the full displacement, the low-pressure pump takes fluid from the suction tank and discharge it into the suction of the high-pressure pump, which in turn boosts the pressure to full manifold value. Thus each pump is subjected to a differential pressure equal to only one-half of line pressure. It is obvious that the pump wearing parts of the low-pressure pump are thus protected against the full severity of full line pressure. Similarly the high-pressure pump is protected against the full severity of line pressure by its being subjected to a differential pressure only. It is easy to see that valve work under this condition is reduced as it is only sealing the differential pressure, and it is known that pistons and liners obtain like benefits. Also, large pistons normally used in series work are inherently better than extremely small pistons.

Third-Pump Benefits

For most satisfactory multiple-pump operation it is best to have a third pump of like size to be used in case of a shutdown of one of the two line pumps. However, it is not always possible to have an extra pump, and when one pump must be shut down it is interesting to note that series operation has an advantage over parallel operation. When one pump of a parallel operation is stopped, the remaining pump will supply 50 per cent as much displacement, 33 per cent as much pressure, and the horsepower as a result will drop to 17 per cent of that originally supplied.

In series, the remaining pump tends to continue full displacement and would do so if sufficient engine horsepower were available. With engines proportioned to the pump size, the pump speed will be reduced until the engine horsepower capacity balances that of the pump load. This point occurs when the displacement is equal to 65 per cent, producing 50 per cent pressure and as a result 33 per cent horsepower. Examination of Table 1 will help clarify these two examples.

If sufficient horsepower is available, added work can be done up to the overload capacity of the pump. Thus it can be seen that during an emergency period, with one pump shut down, the remaining pump of a series arrangement can deliver from two to four times as much horsepower as one of a pair of parallel pumps. These overload conditions are also tabulated in Table 1.

Another obvious advantage of series operation is the availability of accumulative pressures for emergencies.

TABLE 1—STANDBY CHARACTERISTICS OF MULTIPLE PUMP OPERATION

Pump combination—	Piston diam.	Pump r.p.m.	Volume total	Volume 1 pump	Pressure total	Pressure 1 pump	Hyd. hp. total
1 Two in parallel	6¼	65	970	485	2,500	2,500	1,400
2 One in parallel	6¼	65	485	485	825	825	235
3 Line 2 in % line 1		100	50	100	33	33	17
4 One of series	8½	65	970	970	2,500	1,250	1,400
5 One of series	8½	42	630	630	1,250	1,250	460
6 Line 5 in % line 4		65	65	65	50	100	33
7 One of series, 125% load	8½	48	720	720	1,560	1,560	670
8 Line 7 in % line 4		74	74	74	63	125	48
9 One of series, 150% load	8½	54	810	810	1,875	1,875	890
10 Line 9 in % line 4		83	83	83	75	150	64

Assumptions: Pressure varies as 1.6 power of ratio of volumes hp. varies as 2.6 power of ratio of volumes.

Types of Drives

Along with the increase in pump-capacity requirements, there has been also a growing need for better speed control for circulating or contributing functions. The conventional mechanical drive lends itself well and efficiently from rated speeds down to approximately 50 per cent speed. Under some drilling conditions this reduction in speed does not reduce the circulation rate sufficiently to reduce the horsepower load to within the engine capacity. Under this condition the engines will stall and the only recourse is to reduce the liner sizes or in extreme emergencies to inactivate one of the pistons.

In many cases the drive ratio is purposely increased to lower the pump's maximum operating speed, throughout the entire drilling operation, to avoid excess circulation and pressure when it becomes necessary to use small drill pipe for the completion of a well. This is obviously a compromise.

Two-speed mechanical drives have been introduced to expand the mechanical drive speed range to both higher and lower values. A low-speed ratio presents the possibility of greatly overloading the pump. In cases of emergency this is often necessary and justifiable, but care should be taken not to operate under these conditions over extended periods of time.

Under other conditions where smaller volumes are required than are possible with minimum pistons, a low-speed ratio will actually avoid a pump and engine overload.

Hydraulic coupling applications on rig drives have mounted to a point where a large portion of big rigs are so equipped. It has been recognized that the hydraulic couplings have provided an ideal drive for the hoisting portion of the rig, giving these advantages: shock absorption between the engine and transmission; isolation of the engine mass system so that torsional vibrations can be avoided or at least reduced to a minimum; and excellent speed control under full engine torque without the danger of stalling the engines.

Many of these advantages are carried over into the application of a hydraulic coupling on a pump drive. Aside from these equipment-saving features, the point uppermost in the user's mind is the ability to operate the pump at full pressure and low volume at, or near, stalling conditions. The operator can rest assured that the engine will not slow down beyond the speed at which maximum torque occurs.

Under the discussion of two-speed pump drives, this paper mentions that occasional high-pressure low-volume overload conditions are probably necessary and justifiable during emergencies. These high pressures at near-stalling speeds also can be obtained by operating pumps in series, taking advantage of the favorable hydraulic coupling characteristics. Due to reduced inertias at these slow speeds, the couplings alone can compensate the fluctuating volume condition between pumps

Torque converters have come into rather prominent use, principally on small rigs. In driving pumps, torque converters facilitate a minimum number of piston-diameter changes, making possible the drilling to moderate depths with only one piston size.

By properly proportioning the drive ratio, the pump can be operated at high speeds under top-hole large-volume conditions. The light gas-free

mud commonly used at the top of the hole generally will allow speeds in excess of rating.

The torque converter has substantially the same shock-absorbing characteristics as the hydraulic coupling and serves equally well as an equipment saver.

The principal difference is that the torque converter provides a means of multiplying the torque to the pump input shaft. This provides for emergency high pressures with a corresponding pump overload. To obtain this added versatility a compromise is necessary in over-all efficiency, as the converter is less efficient than a straight mechanical drive or a hydraulic coupling in the usual operating range.

Since the application of a torque converter is somewhat complex, Figs. 2 and 3 are included to demonstrate the principle of applying three-stage and single-stage converters to a pump.

In the case of the three-stage converter (Fig. 2) the drive ratio is arranged so that the converter output shaft is operating at 44 per cent of the input shaft speed when the engine and pump are running at rated speed and load. Thus the maximum horsepower delivery of the converter coincides with the rated pump speed under full load conditions. The maximum horsepower delivery point has been chosen rather than the maximum efficiency point for two reasons. First, the delivered horsepower to the pump at rated speed is slightly greater and, second, the torque multiplication to the pump input shaft is somewhat reduced.

This method of applying a converter to a pump results in the following: Maximum horsepower is delivered to the pump through its favorable operating speed range, overspeed is made possible with usable pressures, and the over-all torque multiplication under stall conditions is brought more into line with the pump's mechanical strength for short-period high-pressure emergencies.

The single-stage converter (Fig. 3) is applied substantially in the same manner, but it must be remembered that this converter is slightly more efficient, particularly for low speed reductions through the converter itself (high converter output shaft speeds). Applying the converter at a higher speed ratio appears attractive because of the higher efficiency, but to do so the pump overload would be further increased.

The versatility of the torque converter drive is better illustrated by examination of Fig. 4. In this figure pump performance for a single-stage torque-converter drive with a single liner size is superimposed on mechanical drive performance with four liner sizes. Mechanical drive may be with or without hydraulic couplings.

The pump performance is measured in displacement and pressure against well depth. It can be seen that the mechanical drive, when ample liner changes are made, will establish higher volumes and resulting higher pressures than the torque-converter drive because of the better over-all efficiency.

It is noted, however, that the displacement curves for the mechanically driven pump show a greater decrease in volume than the curves for the converter-driven pump as the depth increases. When the pump is forced to slow down, as drilling progresses, the decrease in pump horsepower is less with the converter drive, even though the converter efficiency is reduced. Thus a liner size can be used over a greater depth range.

Relation of Pump Load to Rating

A soundly engineered power pump rating is largely based on durability

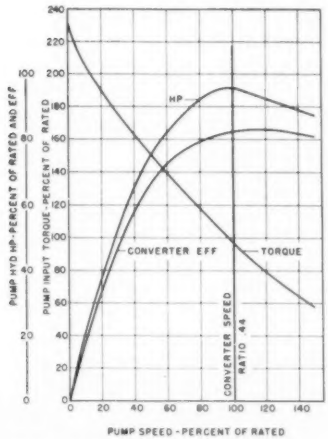
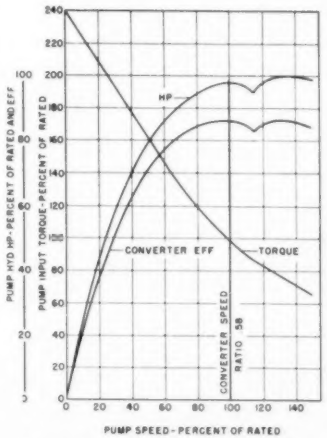

PUMP HYD HP - PERCENT OF RATED AND EFF
PUMP INPUT TORQUE - PERCENT OF RATED
HP
CONVERTER EFF
TORQUE
CONVERTER SPEED RATIO 44
PUMP SPEED - PERCENT OF RATED

Fig. 2—Performance characteristics of three-stage torque-converter pump drive


PUMP HYD HP - PERCENT OF RATED AND EFF
PUMP INPUT TORQUE - PERCENT OF RATED
HP
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CONVERTER SPEED RATIO 58
PUMP SPEED - PERCENT OF RATED

Fig. 3—Performance characteristics of single-stage torque-converter pump drive

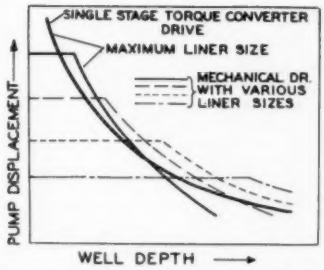

Fig. 4—Converter versus mechanical drive performance

since such important elements as gears and bearings are rated on this accepted practice. The relative life-load relationship of these parts can be computed. The nominal rating may be selected on the basis of a high rating with short life or a low rating with long life.

Parts rated on a conservative durability basis will have an excessive strength measured in terms of yield or ultimate strengths. Other parts when designed for satisfactorily low deflections will have similar reserve yield and ultimate strengths.

This makes possible the operation of power pumps at large overloads for a short period without any visible damage. However, it must be remembered that on a durability basis, life varies inversely with approximately the third power of load. For example, the bearing industry has determined that an increase of 100 per cent load on a bearing will reduce its life to between 1/10 and 1/8 of the original value.

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The Shell terminal and compounding plant at Sewaren occupies 175 acres on the New Jersey coast and includes a tank farm with storage capacity of 2,500,000 bbl. During an average month the terminal handles 40,000,000 gal. of gasoline and technical products, 3,750,000 gal. of asphalt and asphalt products, and 1,500,000,000 gal. of petroleum-derived chemicals. The plant supplies gasoline, motor oil, and other products to metropolitan New York and surrounding areas, automotive and industrial lubricants along the Eastern Seaboard from Maine to Georgia, and specialty products to many states east of the Rockies

SHELL'S *Sewaren* PLANT

This installation is devoted to the handling of petroleum products. Sewaren includes one of Shell's largest compounding units, chemical and asphalt plants, and Shell's most complete laboratory on the East Coast. The entire line handled here ranges from alcohol to motor oil . . . from aviation gasoline to furniture polish . . . from fuel oil to rust preventives.

A LARGE variety of petroleum products, ranging from aviation gasoline and alcohol to insecticides and furniture polish, make up the more than 46,000,000 gal. of petroleum products handled by the Shell Oil Co. terminal and bulk plant at Sewaren, N. J. This large installation includes facilities for compounding lubricating oils and specialty products and blending of asphalts, as well as distribution of petroleum-derived chemicals, gasolines, and heating oils. Shell's most complete testing laboratory on the East Coast is located at Sewaren.

A dozen or more ocean-going tankers unload at the terminal—and some 3,000 tank trucks, 600 to 700 freight trucks, 350 tank cars, and 150 to 200 barges are shipped out in an average month. Gasoline, motor oils, and other products are distributed to the New York metropolitan area and the eastern seaboard, while specialty products also go to many areas in the Middle West.

Compounding plant.—Lubricating-oil base stocks come to Sewaren by tank car and tanker from the Shell refineries at Wood River and Houston. Blending of the base stocks is conducted in large open-top kettles, having capacities up to 10,000 gal., in which the batch is agitated at temperatures between 90° and 120° F. Additives to prevent foaming and corrosion are proportioned to the batch.

As each lot passes laboratory control tests it is piped to storage or to the filling department. An extensive pipe-line system is employed through which flow more than 500 separate products to 148 different destinations. In the filling department four filling units handle some 700 to 900 drums and make as many as 19 changes daily from one product to another. A high degree of mechanization is provided in washing, reconditioning, and painting of drums. Long lines of

containers, in a large variety ranging from 1-qt. cans to 55-gal. drums, move on roller conveyors through the plant. To aid the filling department in regulating the flow of containers in the correct sizes as related to the products with which they are to be filled, telescriber units are installed in different departments. Messages written on the panel of one instrument reproduce automatically on all the others.

The specialties section at Sewaren prepares many special petroleum-based products in its own compounding room. An average of 70,000 gal. per month are processed here, comprising such diverse products as insecticides, a preharvest spray that prevents apples and pears from dropping prematurely, floor wax, furniture polish, spot remover, glass cleaner, and lighter fluid.

Asphalt blending.—The plant blends some 1,100,000 bbl. per year of asphalt. Special precautions must be taken in handling asphalts. To insure efficient pumping in loading and unloading, asphalt is heated to between 300° and 340° F. Heating with steam coils in storage tanks is supplemented by circulation of the asphalt through auxiliary heaters before shipment. Even small amounts of water must not be allowed to collect in drums or tanks that are to be filled with asphalt. This precaution is necessary to prevent sudden and possibly explosive conversion of water into steam as hot asphalt is loaded into the drum or tank.

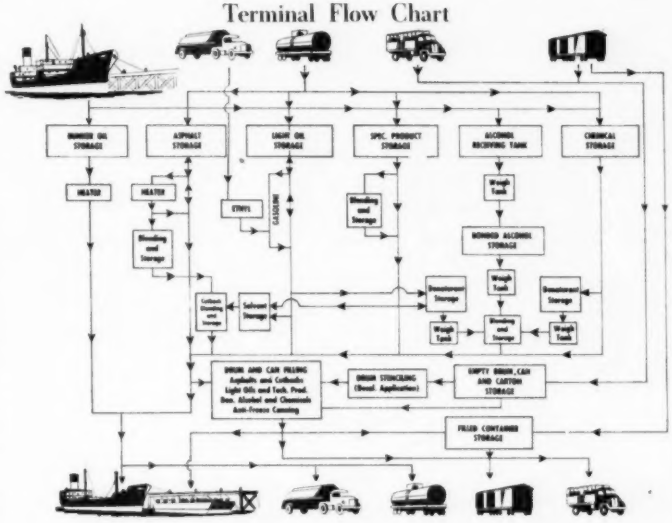
Asphalt in two basic grades arrives by tanker from Curacao, N.W.I. Eight asphalt blends are made which are then "cut back" with rubber solvent, V.M. & P. naphtha, mineral spirits, kerosine, or other diluent, for use in road building or roofing manufacture. Asphalt blending is conducted in tanks and with the aid of mixers built into the pipe-line system. Blending operations are complex in practice and require the use of proportioning pumps and control valves.

Chemical handling.—Distribution facilities for chemicals have been increased gradually to keep pace with the expansion of Shell's petrochemical operations at Houston. An important chemical handled at Sewaren is ethyl alcohol which enters into the preparation of many products including paints, plastics, photographic film, and anesthetics. With the completion of the synthetic ethyl alcohol plant at Houston, shipments by tanker to Sewaren were inaugurated. Pure alcohol is shipped under bond, stored and denatured under government supervision. Other chemicals distributed in tank car and truck loads and by drum include isopropyl alcohol, methyl isobutyl carbinol, acetone, methyl isobutyl ketone, and methyl ethyl ketone.

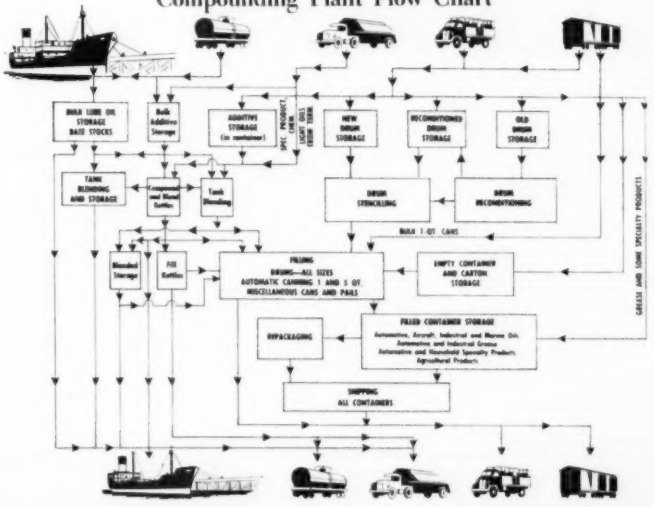
Laboratory.—The laboratory facilities at Sewaren have a twofold function. Product control is a daily task assigned to one department of the laboratory while another section is engaged in the development of new and improved products. The control laboratory checks samples from incoming tankers and from the compounding, chemical, asphalt and other installations. Products are tested on arrival, whenever they flow through the pipe-line system to storage, and during processing. Before shipment they are checked against standard specifications to insure purity and uniformity.

The products application laboratory conducts tests in cooperation with burner manufacturers to determine the grade of oil best suited to a given burner. More efficient methods of burning to save fuel oil and improvements in various types of burners are developed. At the same time testing devices that aid in the correct application and more efficient use of oil products undergo constant improvement and development.

Terminal Flow Chart

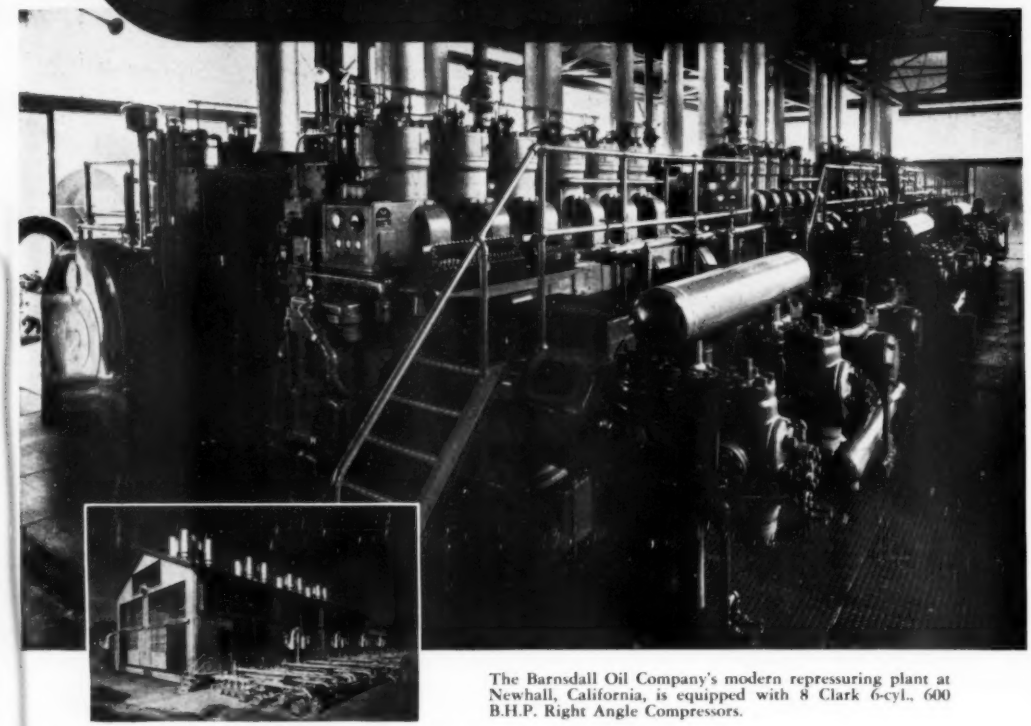


Compounding Plant Flow Chart



These charts show what happens to oil from the time it enters the Sewaren plant for storage or processing until it is reshipped. Processes are greatly simplified but the main patterns of the plant's operation are demonstrated. Note particularly the many modes of transportation used to carry products to and from the plant

Barnsdall equips new repressuring plant with Clark "Angles"



The Barnsdall Oil Company's modern repressuring plant at Newhall, California, is equipped with 8 Clark 6-cyl., 600 B.H.P. Right Angle Compressors.

● Barnsdall Oil Company employs the most modern repressuring methods in developing its Rancho-San Francisco lease at Newhall, California. Dry gas is forced back into the sands at the rate of 20,000,000 cu. ft. per day to maintain high rock pressures.

In designing this plant, Barnsdall naturally sought to avoid waste of valuable gas. That meant the plant must be equipped with thoroughly reliable compressors, dependable for continuous operation.

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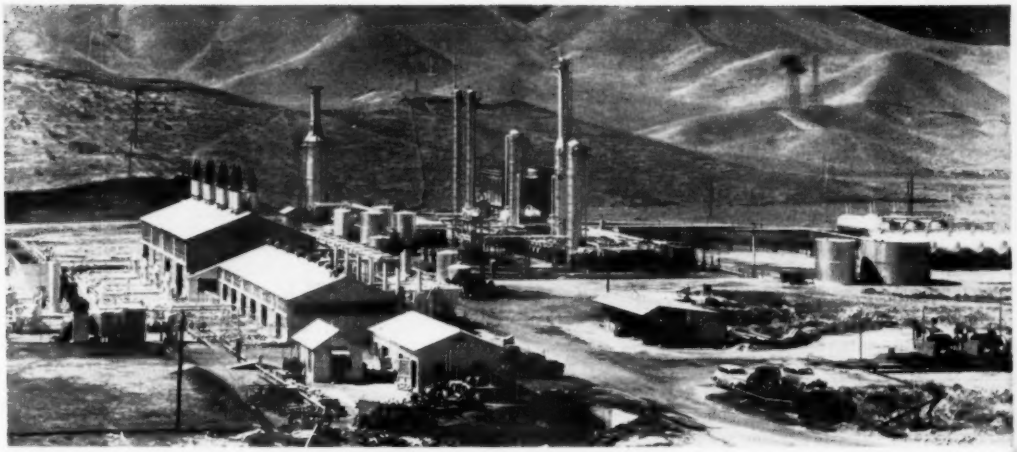


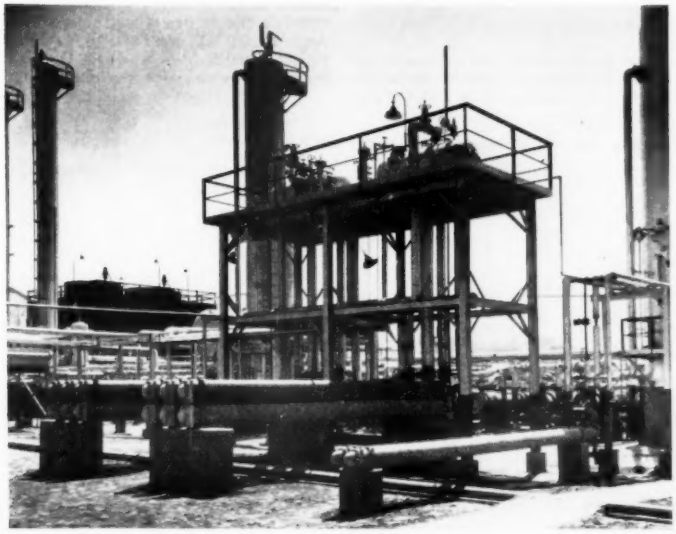
The Barnsdall Oil Co. gas and gasoline plant on the Rancho San Francisco near Newhall, Calif. Plant capacity is 40 million cubic feet of gas per day received from Newhall-Potrero field at line pressures of 60, 175, and 500 psi.

Design and Construction Details on

Barnsdall's Newhall-Potrero Gas and Gasoline Plant

by Melroy Welch

The waste-heat boiler. Steam is generated in two banks of six fin-type exchangers, via heat exchange with stripped lean oil. Heated water rises, due to thermosyphon effect, to steam release drums shown on the platform



This is the second article The Oil and Gas Journal has published on Newhall-Potrero field operation in California. The first, in the June 9, 1949, issue, dealing with the reservoir, was "Performance of Primary Pressure Control" by Oran A. Graybeal, chief reservoir engineer of Barnsdall's California division.

DESIGN capacity of the absorption section in Barnsdall's Newhall-Potrero plant is 40,000,000 cu. ft. per day at 450 psi. operating pressure on the main absorber. Compressors boost low-pressure wet gas to absorber pressure and then boost dry gas from the absorber to 2,000 psi. for reservoir injection. All gas not required for fuel is reinjected.

Wet gas is produced from oil wells through two-stage oil-gas separators. About 60 per cent of the gas is available from the high-stage traps at 500 psi., 15 per cent at 175 psi., and 25 per cent at 60 psi. Rich vapors from crude-oil storage are boosted into the 60-psi. system by small field compressors located at the crude-oil tank batteries.

Process Flow in Absorption Plant

All wet gas enters the absorption plant at 450-psi. pressure. It passes through two shell-and-tube gas coolers piped in series so that either may be taken out of service for cleaning while the other is operating without increasing the back pressure on the gas.

An inlet scrubber separates any liquid condensed in the coolers. Two automatic float-operated dump valves discharge the water to waste and liquid hydrocarbons to either crude storage or the absorption system.

Main absorber.—This vessel, 6 by 47.5 ft., contains 20 bubble trays. The

The Author

Melroy Welch, during his 20 years with Barnsdall Oil Co., worked in the construction of its Elwood plant in 1929, the subsequent operation of it, and other gas-department operations. For the past 4 years he has had the responsibility of engineering design and plant operation. During this period compressor facilities and the Newhall-Potrero absorption plant, with necessary lines and shipping facilities, have been built. He is a member of the Paloma Plant Engineering Committee and has been continuously active in the California Natural Gasoline Association and Southern California Meter Association. The accompanying report on the Newhall-Potrero plant was given at the recent meeting of C.N.G.A. in Los Angeles.

Process section. The rich-oil heater is in the foreground. This heater has rated capacity of 19 million B.t.u. per hour and carries the entire plant load

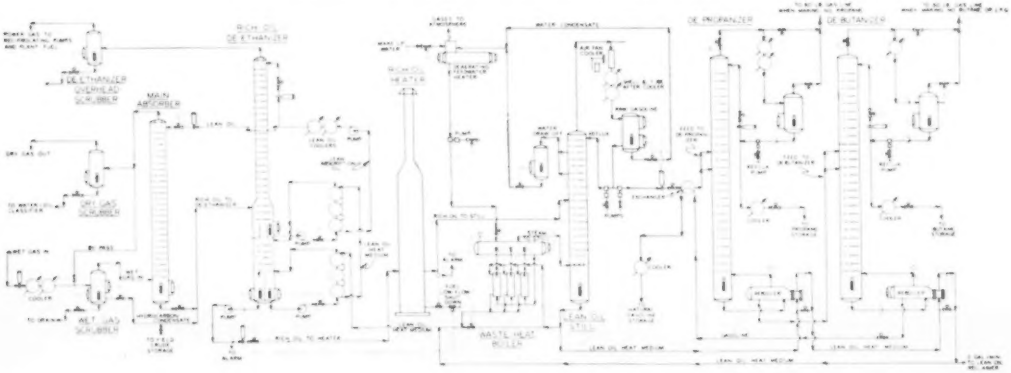
trays are removable and have manways in them which are removable from either top or bottom. The absorber is equipped with a mist-extracting element at the dry-gas outlet. This column has been operated at rates to 45,000,000 cu. ft. per day with an oil rate of 365 g.p.m. without any lean oil pull over. All absorber dry gas not used as fuel is boosted by compressors through two stages to 2,000 psi. for reservoir pressure maintenance. Lean-oil rate is maintained by flow-rate controller on the oil line leading to the absorber. Rich-oil level at base of absorber is maintained by float-type level controller.

Rich-oil deethanizer.—This column is 3 ft. in diameter in the top reabsorbing section and 5 ft. 6 in. diameter in the base stripping section. The height over-all is 78 ft. The function of this column is to eliminate the methane and ethane from the rich oil so that the rest of the plant cycle may operate total condensing. The top section has 20 bubble trays operating as a reabsorber over which 35 to 65 g.p.m. of lean oil is circulated to reflux back any desirable products vaporized from the bottom stripper. The overhead vapors amount to approximately 1,500,000 cu. ft. when treating 40,000,000 cu. ft. The pressure is 150 to 200 psi. and is used to drive process pumps as it expands to fuel pressure.

The lower half of the column functions as a rich-oil stripper in which oil from the main absorber at 450 psi. enters the top tray of this section and flows downward over four heat-exchanger trays to a chimney-type total drawoff tray. The total oil from the drawoff tray is pumped through a preheater, being raised at the present rate from 125° to 225° F. The heated oil is returned into the lower stripping section just below the total draw-off plate and is fractionated through the 10 trays in this section. Any remaining methane or ethane thus released pass upward through the chimney tray to exchange heat

(Continued on page 85)

Simplified flow diagram of Barnsdall's absorption plant



SQUEEZE Cementing

by G. C. Howard and C. R. Fast*

SQUEEZE-CEMENTING problems are so intimately related to the earth's overburden pressure that solutions to them are very difficult, if not impossible, without an understanding of the nature and magnitude of the overburden pressures encountered at the depths of producing wells. The first approach to research on squeeze cementing should be made through a study of these pressures.

Since there has been rather loose usage of a number of the terms related to overburden pressure by different writers, the terms to be subsequently used are defined here.

Theoretical overburden pressure is the calculated pressure at any given depth exerted by the theoretical weight of overlying formations as calculated from the average rock density.

Fluid displacement pressure is that pressure at which fluid can be injected into a formation after it has been broken down. It may be more or less than the theoretical overburden pressure.

Formation breakdown pressure is that pressure at which a formation parts or breaks and is usually thought of as fluid displacement pressure plus rock strength.

Breakdown agent is that fluid with which the formation is fractured.

General opinion is that the overburden pressure gradient of the earth's formations is roughly 1.0 psi. per foot of depth, and that application of sufficient pressure to stratified formations will cause them to part at or parallel to the bedding planes. Neither formation breakdown nor fluid displacement pressures vary linearly with depth. In general, it has been found that the effective overburden pressure at a given depth, as determined from field data, was less than the theoretical pressure or the pressure calculated from the rock densities.

This discrepancy can probably be best attributed to two factors. During the injection of fluid into a fracture in a formation, the entire overburden probably is not actually lifted by the injected fluid. The forces exerted in injecting the fluid probably tend to deform the rock in the vicinity of the fracture by a combination of bending and compressing, such that the actual overburden weight resisting deformation is measured from the formation fracture to some neutral plane well above it.

The second factor tending to reduce the fluid injection pressure, as compared to the theoretical overburden pressure, is the structural position of the formations above the fracture. In some cases it is believed that the structure of the formations above the fractured section of the well bore may tend to support by beam or arch some of the weight of the overburden.

It is interesting to note that, while the 161 wells used in the initial survey represent only a small portion of the total number of wells that have been squeeze cemented, the data obtained from these wells have been proved by subsequent field testing to be reasonably accurate, thus affording a means of estimating the breakdown and injection pressures that will be encountered during squeeze-cementing operations.

Laboratory Shallow-Well Experiments

During the past several years an extensive program on squeeze cementing has been conducted with the objective of improving squeeze-cementing operations. The initial portion of this program involved test work in wells at very shallow depths. A relatively hard sandstone was found a few feet below the surface in the test wells, making extensive

*Stanolind Oil & Gas Co., Tulsa. Portion of a paper presented at meeting of Petroleum Branch, A.I.M.E., San Antonio.

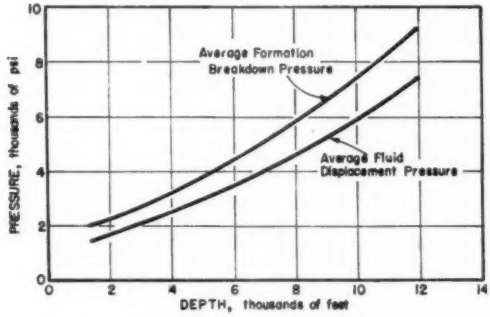

Average Formation Breakdown Pressure
Average Fluid Displacement Pressure
PRESSURE, thousands of psi
DEPTH, thousands of feet

Fig. 1—Average field breakdown and displacement pressures

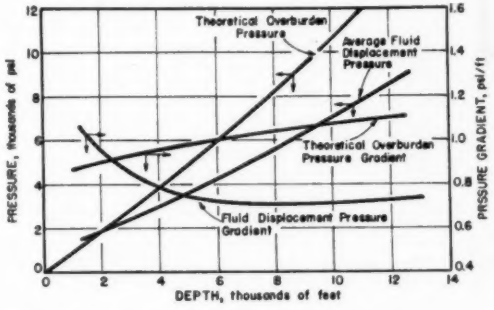


Fig. 2—Comparison of theoretical overburden and fluid-displacement pressures

Some of the more pertinent data obtained from the review of available well files are plotted on Fig. 1, which presents the average formation-breakdown pressures and average fluid-injection pressures for the Gulf Coast and West Texas-New Mexico areas. Fig. 2 presents a comparison between the theoretical overburden pressures (rock-density method) and the fluid-displacement pressures obtained from field data. Shown also is a comparison of the corresponding overburden pressure gradients. The reasonably close agreement between the theoretical overburden pressure and the average field data at the shallow depths probably explains why many observers have concluded that 1 psi. per foot of depth is applicable to deep-well squeeze-cementing operations

testing of various cementing operations possible. These wells were drilled, squeezed using various techniques, and later excavated to observe the results.

Several shallow wells were squeeze cemented in an attempt to determine where the cement goes during squeeze cementing. The first well was drilled to a depth of 9½ ft. with 3-in. casing set at 7 ft. in solid sandstone. The formation was broken down with water at a maximum pressure of 850 psi. and 15 sacks of standard portland cement slurry were squeezed into the formation. A maximum squeeze pressure of 1,500 psi. was obtained. Before and after squeeze-cementing operations, ground elevations were taken at four stations spaced 90°, 5 ft. from the test well.

Data strongly indicated that the cement slurry was squeezed out in a horizontal sheet or "pancake" parallel to the bedding planes and actually lifted the overburden. This proved to be the case when this well was excavated to observe the results. A cement pancake 1½ to 2 in. thick, with a lateral spread of 360° around the well bore, was found just below the casing seat. This cement spread laterally from the well bore more than 5 ft. (extent of the excavation) in all directions.

Fifteen Wells Squeeze Cemented

Fifteen shallow wells were squeeze cemented and in each case the cement spread horizontally from the well in relatively thin sheets approximately parallel to the bedding planes. If a zone of weakness such as a clay streak or bedding plane was encountered, the cement followed this zone of weakness. In some instances vertical fractures, which were generally believed to be caused by weathering, were encountered a few feet from the well bore and the cement followed these fractures.

In only a few instances was any cement forced vertically between the casing cement and the formation. This lack of vertical movement of cement slurry is probably accountable to the fact that good primary cement jobs were obtained in all test wells. In no case was the formation noticeably compacted or squeezed back, nor was the cement slurry forced into the interstices of the sandstone.

To investigate where the cement goes when a well is squeezed more than once a well was drilled to a total depth of 7 ft, 3-in. pipe set and cemented, and the well deepened approximately 1 ft. This well was squeeze cemented three times with different colored cement for purposes of identification. Red slurry was used on the first job, after breaking down with water, and nearly a cubic foot of slurry was displaced at a pressure of 50 psi. before the pressure built up to approximately 500 psi. The following day the hole was cleaned out, the formation again broken down, and approximately 1½ cu. ft. of yellow-colored cement slurry was squeezed out at 20 psi. before the pressure increased to 500 psi.

The third squeeze job was performed approximately 4 hours later, after drilling out the cement plug and breaking down the formation a third time with water. Black cement slurry was squeezed into the well at 30 psi., and after 1½ cu. ft. of slurry had been placed, the pressure again increased to 500 psi. Subsequent excavation of this well showed that the cement slurry exhibited a general tendency to follow the squeezed cement of previous jobs. The cement pancake observed was composed of a layer of red and yellow cement.

When considering only the effects of the breakdown agent on the cement squeezed out into a formation, the advantages of water over mud were apparent early in the testing program. A summation of shallow-well tests showed that approximately 98 per cent of the perforations broken down with water and squeezed with cement were sealed, as compared to an approximate 80 per cent shut-off attained on those squeeze jobs where the formation was broken down with mud.

In considering the possible application of these data to field usage, it should be remembered that the use of water as a breakdown agent presents the possible hazard of a partial drowning of the producing formation. Another objection to the use of water to break down formations is that it may not fracture highly permeable zones. Mud, on the other hand, will break down highly permeable formations, and in field usage is believed to be less likely to damage oil sands, especially if the mud has low-water-loss characteristics.

Tight Bond Prevented

The injection of mud ahead of cement on squeeze jobs is likely to fracture the formation a greater lateral distance than would water. However, the mud film left on the face of the formation and on the primary cement sheath will tend to prevent a tight bond between the squeezed cement, cement sheath, and the formation.

Neither mud nor water appears to be a satisfactory breakdown agent prior to squeezing cement in all formations, each material having certain advantages and disadvantages. Theoretically it appears from a study of shallow-well tests that a low-water-loss cement would be a good material for this use since it would not possess the disadvantages of either water or mud.

The objective of some squeeze jobs is to displace the cement slurry into the formation at a given elevation to prevent the vertical migration of undesirable fluids. In order to determine the probability of success of this type of operation, a number of shallow-well squeeze jobs were conducted.

Two wells demonstrated that in order to spot a cement pancake at a desired elevation, the formation must be relatively homogeneous. Due to the fact that such formations are seldom encountered in the field, the breakdown agent and the cement slurry will be squeezed out into the isolated section of the formation at the weakest point, whether it be a notch in the formation, a bullet hole, or a weakness caused by a bedding plane or a soft streak in the formation.

Subsequent shallow well squeeze jobs through perforations in pipe, where the formation was relatively homogeneous, indicated that the cement slurry entry point into the formation could be controlled by the elevation of the perforations.

Determining Penetration

To determine if cement penetrates equally well in all directions between bedding planes, open hole squeeze jobs were performed on nine shallow wells with as many as three successive jobs in one well. In every case a 360° lateral spread of cement was obtained and the cement pancakes appeared to be of better quality and greater thickness than those formed by squeezing through perforations.

In order to determine the lateral spread of cement squeezed through perforations, three shallow wells were utilized. Cement was squeezed out 19 perforations, both singly and in sets, with a resulting average lateral spread of cement of approximately 140° per perforation. A minimum lateral spread per perforation of 45° and a maximum of 270° were noted.

It has been demonstrated in field practice that perforations are sometimes difficult to plug by squeezing a cement slurry. This has been evidenced by the fact that many times, several squeeze jobs are required to seal completely one set of perforations. During these shallow-well tests, squeeze jobs were conducted on nine sets of perforations in four wells; five perforations were found to be open after squeezing.

On the other hand, a shallow well that was perforated and squeezed five successive times, one perforation at a time, had no unplugged perforations. An analysis of these test results would seem to indicate that, other factors permitting, a well probably should be perforated with as few shots as practicable at the time of testing; then, if it is found that the perforations must be plugged, they could be squeezed off with minimum effort.

It was found in shallow-well tests that the quantity of cement squeezed out into the formation could be controlled to a certain extent by a variation in the squeeze-cementing procedure. After the formation was broken down, it was possible to inject

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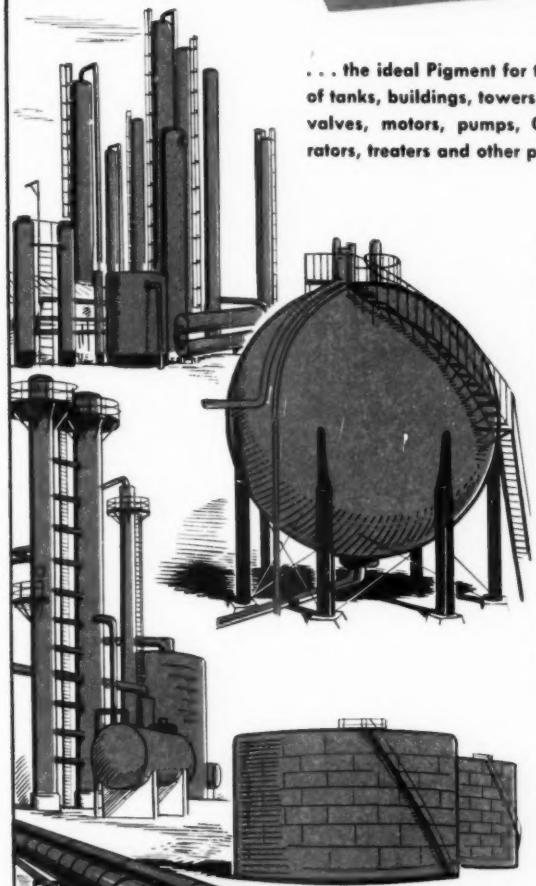

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large quantities of cement slurry into the fracture at a relatively low pressure.

In order to limit the quantity of cement placed during these jobs, slow or hesitation pumping was employed. These procedures consisted of placing a predetermined quantity of cement in the normal manner, then either slowing or shutting down the pumps for short periods to initiate a pressure buildup. In this manner it was possible in many instances to attain high final pressures and limit the quantity of cement slurry displaced even in some of the soft streaks encountered in these shallow wells.

Large quantities of cement were displaced into the formation by the use of low-water-loss cement. Almost unlimited quantities of this cement can be placed without a pressure buildup because it will resist dehydration.

Field Squeeze Cementing

Reviewing the results obtained from the preliminary studies, it became apparent that the ability of a squeeze-cement job to seal perforations is dependent upon the bond obtained between the squeezed cement and the primary cement sheath, rather than on the quantity of cement that can be displaced out into the formation. If the squeezed cement does not bond to the primary cement job, such as to prevent the entry of well fluids into the casing at this point, then all cement squeezed beyond this point serves very little purpose. The initial investigation also indicated that the quantity of cement required to obtain a high final squeeze pressure could be controlled by utilizing special squeeze-cementing techniques.

As past field experience has indicated that most of the successful squeeze jobs were characterized by a high final squeeze pressure, it appeared that this factor might be used as a criterion for judging various squeeze-cementing procedures. By accepting this line of reasoning, it was then possible to rate a given procedure on the number of sacks of cement with which a high final squeeze pressure was obtained. For example, at the present time only 100 to 125 sacks of cement are required for a squeeze job, as compared to the estimated 250 or more sacks previously used.

Using these premises as the basis for forming an improved squeeze-cementing procedure, a technique was recommended to the field for trial in several wells. The basic assumption was that the slow displacement of a cement slurry, once a breakdown had been obtained, would aid in the dehydration of the slurry, and thus help in compacting the squeezed cement into the perforations to be plugged. This procedure would allow control over the quantity of cement to be displaced before the final squeeze pressure is obtained.

Slow Pumping Procedure

The slow-pumping squeeze-cementing procedure used on these field tests consisted principally of the following steps:

1. The retainer was lowered into the well until it was below the zone or perforations to be squeezed.

2. The proper breakdown fluid was circulated to bottom and up into the annulus so that it completely covered the zone to be squeezed.

3. The retainer was raised and set in the pipe a sufficient distance above the perforations to eliminate the hazard of dehydrating cement around the retainer.

4. Approximately 150 sacks of cement were mixed and displaced down the tubing, immediately following the breakdown agent.

5. The formation was broken down and 50 sacks of cement were pumped out into the formation at a high pump rate (2 to 3 bbl. per minute).

6. The next 50 sacks were displaced into the formation at a lower pump rate (approximately 1 bbl. per minute).

7. If a pressure buildup had not occurred by the time the third 50 sacks were started into the formation, the pumps were slowed down to a rate of ¼ to ½ bbl. per minute or lower as long as the cement was kept moving. This very slow pumping almost always resulted in a pressure buildup. Hesitation squeezing, or alternate pumping and shutting down periods, was also found effective, but this practice is somewhat hazardous in that the cement might gel or set while not in motion, and thus resist further movement up or down the tubing or drill pipe.

8. When the pressure buildup occurred, as much surface pressure was applied as the well equipment permitted. The pressure was held for approximately 1 minute before reversing out the excess slurry.

Cementing Pressures

Well conditions on 18 squeeze-cementing jobs, all conducted at depths of approximately 6,000 ft., permitted an evaluation of the desirability of obtaining a high final pressure. Nine of the 18 tests resulted in successful jobs, and the other 9 failed to shut off all perforations. The bottom-hole squeeze pressures of the successful jobs averaged 10,100 psi. or 7,600 psi. differential, while those of the unsuccessful jobs averaged only 7,900 psi., or 5,400 psi. differential. Of course many other factors entered into the determination of success or failure of these jobs, but the overall difference in final squeeze pressures is believed to be significant.

At the present time field practice in some areas has indicated that a final bottom-hole squeeze-cementing pressure equal to well depth times 1.0 plus 2,000 psi. is generally giving satisfactory results. However, limited field experience has indicated that bottom-hole pressures as high as well depth times 0.6 plus 5,000 psi. may be required in shallow wells for satisfactory jobs.

An investigation of 109 squeeze jobs, where a retrievable retainer was used, revealed that only 12 of these jobs were failures. Considering the many other factors that could have contributed to the 12 failures, it is difficult to visualize how any other type retainer could provide improved service. It can, based on this data and past field experience, be assumed that both retrievable and drillable type retainers are satisfactory for squeeze jobs.

The field investigation of formation breakdown agents involved three materials—mud, water, and a mixture of hydrochloric and hydrofluoric acids (HCl + HF). In order to establish a criterion for the three agents, the number of sacks of cement required to obtain a high final squeeze pressure was compared with each breakdown agent used. Table 1 shows the data obtained on these evaluations.

TABLE 1—EFFECT OF BREAKDOWN AGENT ON QUANTITY OF CEMENT REQUIRED

Agent—	No. jobs used	Avg. sacks cement required to obtain high final squeeze pressure
Mud	6	125
Water	6	126
HCl + HF	42	98

This table indicates that mud and water require about the same quantity of cement before a satisfactory pressure can be obtained, but that the mixture of hydrochloric and hydrofluoric acids appears to be the best breakdown agent tested based on the amount of cement required to obtain a high final squeeze pressure.

"WOC" Time

As no definite criterion had been established for the determination of waiting-on-cement time following squeeze-cementing operations, 24 hours, which is accepted by many operators for casing cementing operations, was generally employed on this series of tests. This time was sufficient for every job where it was used and could be evaluated. Since a waiting-on-cement time of less than 24 hours was successfully employed on some of these jobs as well as on other jobs, and since the temperatures and pressures are more severe than those encountered during casing cementing operations, it appears that a reduced waiting-on-cement time may be used with reasonable safety.

Of the 160 squeeze-cementing jobs reviewed, it was possible to obtain complete data on the pressures used in testing the squeezed perforated intervals on only eight jobs. Of these eight, five were tested by imposing pressures comparable to those imposed on the well during its producing life. In each of the five wells tested the low differential pressure tests showed the squeeze job to be successful. The remaining three jobs were tested using a high differential pressure. Two of the three jobs tested showed an unsuccessful squeeze job, with the remaining well testing satisfactorily.

Stage Separation....

by Garman O. Kimmell*

Limits of separator performance are flash and differential vaporization. This article discusses the approach to differential liberation of gas by increasing the number of stages, the economics of such, and the operating pressures desirable.

TWO types of gas liberation define the limits of separation of solution gas from a liquid. The one yielding the most vapor and the least liquid is called "flash vaporization." The one yielding the least vapor and most liquid is called "differential vaporization." Flash vaporization is defined as a liquid system from which the gas is not removed from contact with the liquid as reduction in pressure allows the vapor to come out of solution; differential vaporization gas is removed.

Differential vaporization, of necessity, is a "batch process" and not easily executed in the oil field. Differential separators have been designed and operated; however, two units, each capable of the initial pressure, are required to provide an installation capable of receiving flow continuously. This, together with the prerequisite controls for the differential unit, makes it more expensive than a stage program of several separators and tanks.

One lease problem of production is to resolve the well stream into gas at some pressure or pressures and the crude oil or "distillate" to a liquid which can be stored, and subsequently transported. The conventional separator comes into play at this point. It provides a means for separating free gas at well-head conditions and a part of the solution vapors from the liquid portion. The liquid portion of a well stream separated at elevated pressures still contains a quantity of vapors in solution. In this respect the separator is not a complete and final separator unless operated at storage pressure.

In all but exceptional cases oil is produced through separators into tanks, and the separator serves as an approach to a differential vaporization of the well stream. Any volume chamber in which gas is liberated from the oil and removed is considered a stage. In its course from the reservoir to the first stage, well-stream pressure is reduced and the well stream undergoes a flash-vaporization process (gas not removed from contact with the oil) which is completed in the separator. By definition, flash vaporization starts with a liquid system. If a well were producing excess gas (gas in excess of that required to saturate the reservoir liquid at reservoir conditions), the first stage of separation is not quite a true flash process, but will be considered so in this treatment.

*Vice president, Kimray, Inc., Britton, Okla. Portion of paper presented at the A.S.M.E. Petroleum Mechanical Engineering Conference, Oklahoma City, October 2-5.

Analysis of the problem

In work done by the author in fulfilling the requirements of the master's degree in petroleum engineering at University of Oklahoma, quantitative data were taken around a miniature three-stage separation unit. The method of calculation used to apply vaporization equilibrium constants ("K" values) to the solution of vaporization problems was obtained originally from Mott Souders. This method is used in the development of curves in this treatise.

The mol composition of the gas and oil from the stages and the volume of vapor leaving the stages were calculated from the equation:

$$X_l = \frac{X_f}{1 + V(K - 1)}$$

in which:

X_f = mol fraction of any one component in the feed
V = mols of feed vaporized
Y_v = mol fraction of any one component in the vapor
X_l = mol fraction of any one component in the liquid
K = vaporization equilibrium constant

To determine the fraction of the

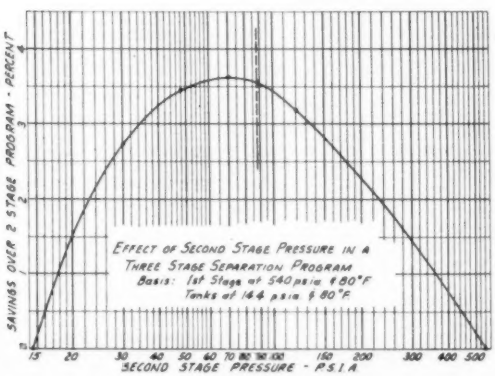

SAVINGS OVER 2 STAGE PROGRAM - PERCENT
EFFECT OF SECOND STAGE PRESSURE IN A THREE STAGE SEPARATION PROGRAM
Basis: 1st Stage at 540 psia & 80°F
Tanks at 14.4 psia & 80°F
15 20 30 40 50 60 70 80 90 100 150 200 300 400 500
SECOND STAGE PRESSURE - P.S.I.A.

Fig. 1

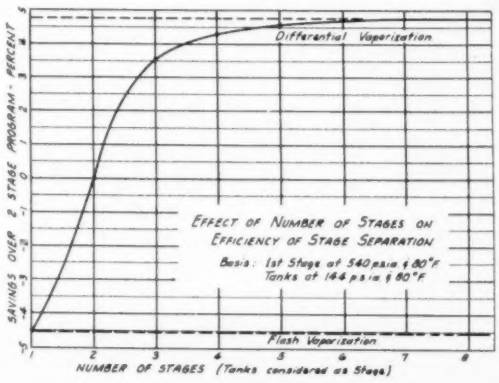

SAVINGS OVER 2 STAGE PROGRAM - PERCENT
Differential Vaporization
EFFECT OF NUMBER OF STAGES ON EFFICIENCY OF STAGE SEPARATION
Basis: 1st Stage at 540 psia & 80°F
Tanks at 14.4 psia & 80°F
Flash Vaporization
1 2 3 4 5 6 7 8
NUMBER OF STAGES (Tanks considered as Stages)

Fig. 2

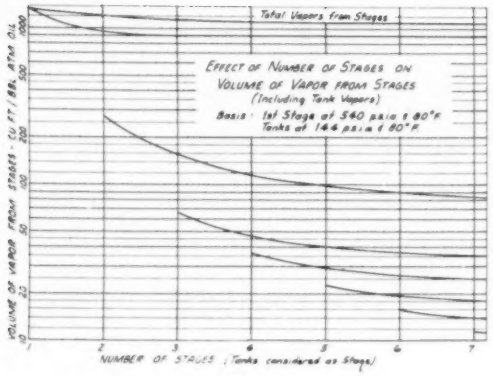

Total Vapors From Stages
Effect of Number of Stages on Volume of Vapor from Stages (Including Tank Vapors)
Basis: 1st Stage at 540 psia & 80°F
Tanks at 14.6 psia & 80°F
Volume of Vapor from Stages - Cu Ft / Bbl. Atm. Oil
Number of Stages (Tanks considered as Stage)

Fig. 3

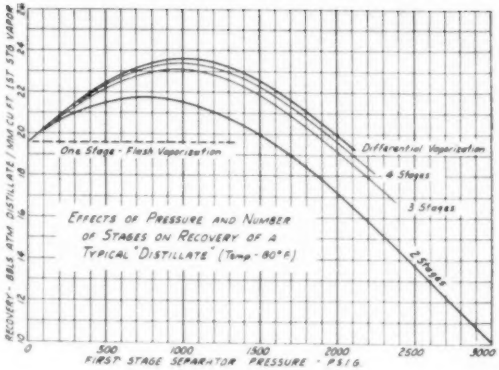

Differential Vaporization
One Stage - Flash Vaporization
4 Stages
3 Stages
2 Stages
Effects of Pressure and Number of Stages on Recovery of a Typical "Distillate" (Temp. - 80°F)
Recovery - Bbls. Atm. Distillate / 1000 Cu. Ft. 1st Stg. Vapor
First Stage Separator Pressure - P.S.I.G.

Fig. 4

mol of feed vaporized it is necessary to assume values for V and calculate the value of X_i for each component. When the sum of the calculated values of X_i is unity, the correct value for V has been chosen. A tabulation method of approach is recommended. The assumed values of V can be plotted against the sum of the X_i terms to interpolate or extrapolate for a very close value of V. It is unfortunate that a more direct method of approach to the solution of vaporization problems is apparently not possible. Much time is required to solve a complete stage problem.

Selection of Stage Pressures

Flowing well-head pressures, gas-gathering system pressures, or other lease conditions, usually determine the first-stage pressure. With first-stage and storage pressures set, the question of interstage pressures arises. In a three-stage program (two separators and tanks), the second-stage pressure can be varied between the limits of first-stage pressure and tank pressures. At either limit the effectiveness of the second stage is completely eliminated. A typical behavior, shown in Fig. 1, takes place when the second-stage pressure is varied between the limits.

Several curves of the type shown have been developed on different composition feeds with the same result. A logarithmic second-stage pressure plot against savings or efficiency results in a slightly distorted parabola. No analytical proof of the shape of the curve has been made, but the distortion seems to be the result of receding vaporization which lowers the optimum second-stage pressure below the geometric mean. The choice of a geometric mean pressure (constant ratio of pressures between stages) between first stage and tanks for the second stage would result in near optimum performance. In cases where the first-stage pressure is in the receding vaporization range, a second-stage pressure, slightly lower than the calculated ideal, should be used.

Constant ratios of absolute pressures between stages can easily be calculated from the following expressions:

$$R = \sqrt[n]{P_1/P_s}$$

$$P_2 = P_1/R \text{ or } P_s R^{n-1}$$

$$P_3 = P_2/R \text{ or } P_s R^{n-2} \ldots .$$

in which:

R = stage pressure ratio = $P_1/P_2 = P_2/P_3 = \ldots P_n/P_s$
n = number of interstages (number of stages — 1)
P_1 = first-stage pressure, psia.
P_2 = second-stage pressure, psia.
P_3 = third-stage pressure, psia.
P_s = storage pressure, psia.

Number of Stages

The addition of separators to a stage-separation program to increase efficiency has its economic limits for the oil producer. Effect of the number of stages on the efficiency of stage separation is shown in Fig. 2. The basis of the savings is on a two-stage program operating at a first-stage pressure of 540 psia. and a tank pressure of 14.4 psia. Ratios of absolute pressures between the stages of each program are kept constant. The approach to differential vaporization is almost complete at six stages.

To make a graphic illustration of the approach to differential vaporization, it is necessary to connect the points by a smooth curve. The curve does not actually exist between points, as it is impossible to operate a fractional stage. Examination of Fig. 1 shows that over and above a two-stage program additional stages provide the following per cent approach to differential vaporization:

No. of stages	Per cent approach to differential vaporization
2	0
3	75
4	90
5	96
6	98½

The current costs of the smallest commercial separators available and an installation allowance of 20 per cent of the cost are used in compiling the following table. Total outlay for increasing the program to the number of stages indicated, per cent of tank liquid saved, and the production necessary to pay out in 24 months (assuming oil at $2.50 per barrel), are shown.

Increasing the program to:	Total cost	Additional tank liquid saved (per cent)	Production rate, bbl. per day to pay out in 2 years (6 per cent on investment)
3 stages	$ 720	3.56	12
4 stages	1,740	.71	143
5 stages	2,460	.28	511
6 stages	3,180	.15	*1,230

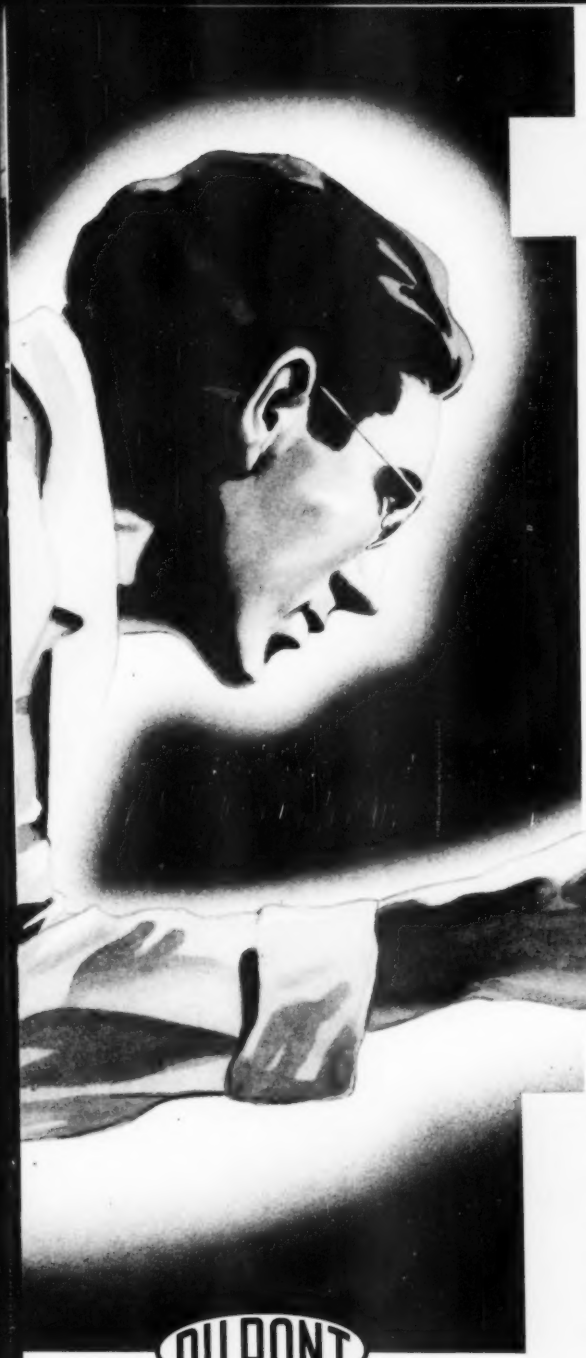
*This rate is slightly in excess of capacities for the smallest separators. Additional cost for additional capacity raises the necessary rate, making payout of a six-stage program doubtful.

Vapors from the Stages

If the well stream is flowed directly to tanks, the tanks would act as a complete and final stage of separation and the gas-oil ratio would be 1,330 standard cubic feet. Increasing the number of stages reduces the total volume of gas produced. The approximate sum of vapors leaving the first stage and that liberated differentially from 540 psia. is 1,087 cu. ft. per barrel of atmospheric oil. This sum is closely approached in a five-stage program.

If the total butanes plus content of all the vapors is added to the tank oil for like quantities of feed to the vari-

(Continued on page 88)



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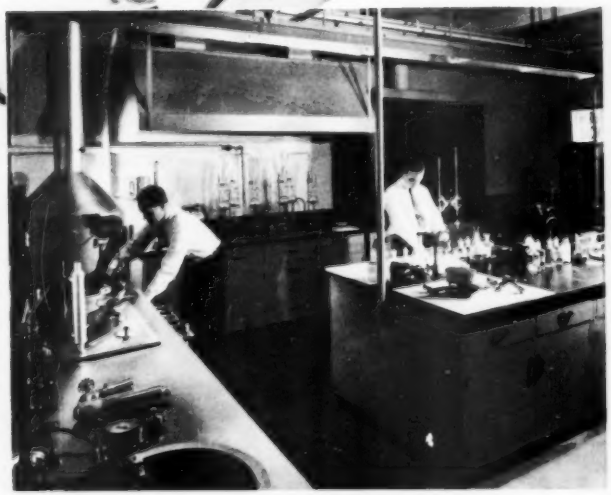

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Help You Meet Your Fuel Requirements . . .

Efficiently . . . Economically

Each Du Pont District Laboratory is a complete unit with full facilities for determining lead susceptibility and for making knock tests on motor gasoline as well as chemical analyses. This, and the fact that Du Pont supplies a complete line of gasoline additives including tetraethyl lead compounds, enables them to make recommendations covering the entire additive requirements of fuel.

Laboratory records show numerous case histories that demonstrate the type of help Du Pont District Laboratories are providing. For example; several refiners were faced with meeting rigid octane specifications. The Du Pont laboratory serving that area ran lead susceptibility tests on many combinations of blending stocks including iso-pentane blends. From the information developed through these tests, the refiners were enabled to meet competitive octane specifications. In another case a suggested change in processing sequence and the addition of antioxidant at an earlier stage led to improved gasoline storage stability.

Instance after instance proves that the helpful cooperation of Du Pont District Laboratories is aiding refiners in the solution of many problems related to additive usage and gasoline refining.

The knock testing section renders many helpful services in connection with determining lead susceptibility of stocks and checking octane number of refiner's blends.

DU PONT
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BETTER THINGS FOR BETTER LIVING...*Through Chemistry*

Du Pont Laboratories Provide Nationwide Check

Of Gasoline Octane Ratings and TEL Content

Tetraethyl lead analyses are run by each District Laboratory as part of their service to refiners in the area.

As a marketing information service to refiners, Du Pont District Laboratories periodically obtain and check filling-station samples of gasolines sold in their area. These fuels, both premium and regular, are tested in the laboratory to determine the octane number, both motor and research, as well as the amount of TEL per gallon.

These reports on individual gasolines are coded and listed so that the interested refiner can check his fuels not only against averages but against individual fuels. These valuable reports are made every three months. This is another example of the helpful services provided by Du Pont Research Laboratories . . . to help the refiner meet specific marketing requirements.

DU PONT

PETROLEUM CHEMICALS DIVISION
MOTOR GASOLINE SURVEY

CITY	CODE NO.	PREMIUM OCTANE NO. MOTOR	PREMIUM OCTANE NO. RES.	PREMIUM TEL CC/GAL.	REGULAR OCTANE NO. MOTOR	REGULAR OCTANE NO. RES.	REGULAR TEL CC/GAL.	DATE SAMPLED
New York, N. Y. (Metropolitan Area)	34	80.9	88.4	2.40	79.4	86.6	2.65	9-26
	47	81.7	89.8	2.53	80.5	85.2	2.64	"
	50	80.8	91.7	0.96	76.0	83.6	0.29	"
	56	80.9	88.2	1.36	80.1	85.0	1.29	"
	61	83.2	88.7	1.79	76.3	83.0	1.34	"
	64	81.3	89.2	1.81	79.0	83.1	1.70	"
	71	82.1	88.7	1.36	80.4	83.4	1.42	"
	72				76.6	84.4	Nil	"
Average		81.6	89.2	1.74	78.5	84.3	1.42	
Philadelphia, Pa.	34	77.7	86.0	1.09	76.0	82.5	1.12	9-27
	37	80.0	89.7	1.22	75.9	83.3	0.70	9-23

MAKE DU PONT THE SOURCE FOR ALL OF YOUR GASOLINE ADDITIVES . . .

Tetraethyl Lead Compounds
(Motor Mix—Aviation Mix)
Antioxidants
Metal Deactivator—Dyes

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BETTER THINGS FOR BETTER LIVING . . . *Through Chemistry*

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
PETROLEUM CHEMICALS DIVISION
Wilmington 98, Delaware

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District Offices: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · Los Angeles, Calif.

Barnsdall's Plant

(Continued from page 74)

with the incoming oil. The vapors then proceed upward through the reabsorber for final stripping.

Bottom of the column below the plates is divided into two surge sections. Oil from the bottom plate flows into one section from which it is pumped through a reboiler currently controlled at 415° F. and returned to the opposite surge chamber. Liquid-level controllers maintain levels in both surge chambers. The deethanized oil leaving this last chamber is pumped through final heat exchangers before going to the rich-oil furnace.

Direct-fired rich-oil heater.—All process heat is put into the absorption oil with this isoflow unit which employs a single pass system of 6-in. o.d. tubes. The furnace has a rating of approximately 19,000,000 B.t.u. per hour. Current fuel consumption is 850,000 cu. ft. per day of deethanizer overhead gas. The furnace is equipped with a controller actuated by temperature of the discharge oil for regulating the fuel gas to the burners. The oil entering the heater is now 380° F. and leaves at 540° F. A low-flow manual reset shutoff valve in the oil line feeding the furnace shuts off the fuel gas at a preset low-flow rate for safety.

Lean-oil still.—This vessel, 5 ft. 6 in. by 49 ft. high, has 18 removable bubble trays with manways removable from either top or bottom. Ten trays are for stripping and eight are for fractionating. Water drawoff is provided at trays 2 and 5. Stripping steam at a present rate of 2,000 lb. per hour is introduced below the bottom tray. The last calculated lean-oil vapor pressure was 4.9 mm. of mercury at 100° F. Still-top temperature is controlled by refluxing raw gasoline from the raw-gasoline accumulator.

Overhead vapors are totally condensed by passing through an air-fan cooling unit where about 75 per cent of the heat is removed, then finally cooled in shell-and-tube condensers. The air cooler reduces the total cooling-tower load by about 33 per cent. Stripping-steam condensate from the drawoff trays and the raw accumulator is returned to the steam generator. Raw gasoline from the accumulator goes to the first stabilizer to be depropanized.

Hot lean-oil heat medium.—All hot lean oil from the bottom of the lean oil still is used as heat medium to generate steam; to preheat power gas for pump drive; to supply heat to reboilers on depropanizer, debutanizer, and deethanizer.

Lean-oil cooling system.—Lean oil from the still, now running 512° F., furnishes heat for all process. It then exchanges heat with the rich oil to furnace. The oil is boosted to absorber pressure through centrifugal pumps before entering the final coolers at 166° F. under present conditions. It is cooled to 83° F. Cooling after pumping removes the heat also generated in the pump.

Depropanizer.—This column, 3.5 ft. in diameter by 68.5 ft. high, has 40 removable bubble trays. Bottom product may be either a depropanized or debutanized gasoline. The reboiler utilizes hot lean oil as heat medium.

Overhead vapors are cooled in a shell-and-tube condenser. Reflux is fed by a gas-driven reciprocating pump, through an automatic flow-recorder controller. Surplus condensate passes through a "G-fin" cooler into storage. Bottom product may go to storage as a high-vapor-pressure gasoline or may be fed to the debutanizer. Should L.P.G. storage become full and the high level alarm go unheeded, an automatic level control will cause the overhead vapors to bypass the cooler and dump into the wet-gas system. The column is depropanizing now at 235 psi. pressure, 116° F. top and 240° F. bottom temperature. Reflux rate is 55 g.p.m. when making 24,000 gal. of propane per day. The plant wet-gas feed is 36,000,000 cu. ft. per day.

Gasoline debutanizer.—This tower, 3 ft. in diameter by 68 ft. tall, is equipped with 40 removable bubble trays. The column has identical auxiliary equipment to the depropanizer, including the automatic vapor bypass system. It produces butane overhead and any desired vapor-pressure product from the bottom. It is presently making 12,750 gal. of mixed butanes overhead, 14,775 gal. of 22.6-lb. R.v.p. gasoline when treating 36,000,000 cu. ft. per day of wet gas. The column pressure is 97 psi. with a top temperature of 140° F., bottom temperature of 209° F., and a reflux rate of 22 g.p.m.

Steam generator.—Steam for process is generated in a waste-heat-type flash boiler. Hot lean oil at 440° F. furnishes heat to generate steam from 150 to 170-psi. pressure.

The boiler is made up of two units, each having 6 G-fin sections each, connected two in series and three in parallel. Heat is supplied by hot lean oil flowing on the fin side and water in the inside of the tubes, for ease in cleaning and descaling.

Condensate tubes are connected to a mud drum at the bottom and to a steam release drum mounted about 15 ft. above. The condensate circulates by thermosiphon. Steam drums are provided with the same equipment for level control, blowdown, etc., as a conventional boiler would be. The water feed is 90 per cent return condensate. Feed-water pumps are driven by expanding fuel gas. A deaerating feedwater heater operating at 230° F. with 5 psi. back pressure removes any entrained gases. The feed is treated and concentrations maintained by regular blowdown. The exchangers have required descaling but once, in 12 months of service. The two units are separate, so one may be cleaned while the other is in operation.

Water-treating system.—Raw water obtained from deep wells runs 40 grains hardness. A Zeo-Karb-Na treating system consisting of two units of a maximum capacity of 170 g.p.m. per unit softens all water used in the plant. The raw water passes over a coke aerator to oxidize the iron and manganese. A 2,000-bbl. tank provides settling time for the oxidized particles to drop out. The feed to the plant is treated with a small amount of alum, then passes through sand filters before entering the Zeo-Karb beds. All plant water is softened, then inhibited by use of glucosides and glucosates. Cooling-tower water is maintained at a desired pH value by the continuous addition of sulfuric acid. Algae control of cooling water is accomplished with bromine. Boiler feed water is deaerated at 230° F.

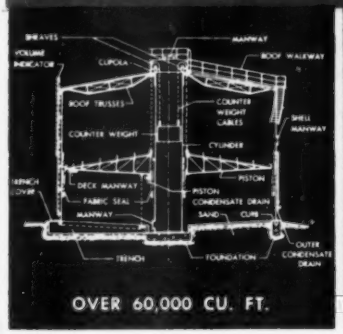
An inspection of lean-oil coolers showed no corrosion nor scale on the admiralty metal tubes after 10 months of service. There is no algae apparent after 12 months of operation. The plant uses about 75,000 gal. of water per day.

Pump drives.—Multicylinder gas engines drive the centrifugal pumps for cooling water, lean-oil circulation, transfer pumps, cooling-tower fans, air-cooler fans, and air compressors. All services either have spares or common spares to facilitate a program of preventive maintenance. Exhausts are all joined in a common header and conducted to a safe area. The cooling-tower continuous blowdown is run through the header to reduce heat and back pressure. No scaling or corrosion is evident in the header since the water is inhibited and the quantity is great enough that little evaporation takes place. Expansion joints protect exhaust headers from piping strains. Spectacle plates prevent exhaust gases from entering and condensing in those shut down.

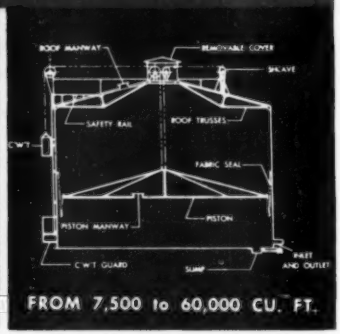
Reciprocating steam-type pumps are driven by expanding fuel gas which in operation is reduced from 170 psi. to fuel pressures. All process pumps such as column feed, reflux, boiler feed, lean-oil charge, etc., are driven by this means. The power gas is preheated by lean-oil exchangers to 150° F. A regulator connected to the dry-gas system insures drive gas if plant is short of overhead vapors. Excess gas not required for fuel returns to low-stage compressors. Ordinary gas-engine oil is used for lubrication of power cylinders.

Instruments and controls.—All recorders and controllers are installed on a central panel, located near the process pumps. The controllers are air operated. All miscellaneous plant temperatures are taken on two potentiometers equipped with multiswitches. Any two temperatures de-

WIGGINS *Dry Seal* GASHOLDERS



OVER 60,000 CU. FT.



FROM 7,500 to 60,000 CU. FT.

have proved a profitable investment, because they offer . . .

1. A Gasholder with efficient operation and easy maintenance.

a. Not affected by snow load since all moving parts are under cover.
b. All major moving parts accessible for inspection during operation.
c. A vapor balancer that can be made gas free for repairs in a few hours.
d. A vapor seal that has a life equal to that of the tank.
e. A Gasholder working pressure of ⅛ to ¼ inch of water.

2. A vapor balancer that has a 100% Dry Seal.

a. Eliminates corrosion problems attendant with wet seals.
b. Requires no heating system during freezing weather.
c. Has no evaporation loss through a water or oil seal.
d. Requires no attention, adjustment or lubrication.

3. One vapor balancing mechanism for all tanks.

a. Provides flexibility of operation.
b. Permits repair of any tank in group without affecting operation.
c. Allows vapor balancer to be removed without disturbing storage tank operation.
d. Accomplishes all venting through one master valve.
e. One structure for protection of all standing and pumping loss.

For more complete details and Pay-Out Analysis, write for Bulletin VB-10

GENERAL AMERICAN TRANSPORTATION CORPORATION

WIGGINS VAPOR SEALS — GENERAL AMERICAN — TRADE MARK

135 SOUTH LA SALLE STREET, CHICAGO 90, ILLINOIS

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GREAT BRITAIN: Motherwell Bridge & Engineering Co., Ltd., Scotland
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sired may be recorded on charts. There are 40 points available for potentiometer connections.

Air, instead of gas, is used to operate all controllers because it is less hazardous and more economical. At present gas prices, the two engine-driven compressors will pay out in less than 2 years. The air system has a cut-in regulator connecting the starter air system to the instrument air in case of engine failure. The compressor has 100 per cent standby. Air coolers and filter elements protect instruments from condensate in the lines.

Absorption plant piping.—All lines are aboveground, except sewers. Regulators and control valves have been piped down to ground for easier servicing. Nearly all bypass valves, etc., are either piped within reach of the ground or have operating chains attached. All flanges are steel.

Cooling tower.—The unit, a two-cell induced-draft installation with gas-engine fan drive, is 40 by 37 ft. by 28 ft. tall. It cools 2,000 g.p.m. with an initial temperature of 93° F. down to 72° F. when the relative humidity is 33 per cent.

The tower has a drift wall between sections and a divided basin, so that by closing an irrigation-type water valve, the units may be separated and one side cleaned at a time.

A.P.I. water-oil separator.—Unit is 5 ft. deep by 8 ft. wide by 90 ft. long, and allows complete separation of oil particles from any waste water in the plant. It has three main compartments equipped with mechanically adjustable skimmers, a slop pump, and a hay-filled filter to insure oil-free waste water for discharge to the country drainage system.

Coolers and exchangers.—Shell-and-tube coolers, and wherever possible the exchangers, are in pairs and connected in series with bypasses, so that one may be removed from service for cleaning without increasing the back pressure on the system. The equipment is not stacked, but is kept on one level for greater facility in cleaning tubes if necessary.

Plot arrangement.—Plant areas are carefully engineered as to operational work pattern. Space was reserved to allow for doubling the amount of plant equipment without interference with existing installations. The fired heater is located upstream and cross wind from process and storage. Surface cross drainage makes for safety in case of a spill. Drainage sewers are individually trapped so prevent a flash. All principal vessels are grounded by copper conductors to buried grounds located below dry-year-low-water table. The cooling tower is located across wind from principal equipment.

Product storage.—A minimum capacity of 3 days' production is provided. Propane storage consists of four horizontal tanks of 20,000 gal. each. Butane storage consists of two

20,000-gal. tanks of same specification. Gasoline storage is made up of three horizontal 30,000-gal. tanks. The L.P.G. tanks are designed for 250-psi. working pressure. The gasoline tanks are 50-psi. vessels.

Product - loading facilities. — There are two truck-loading docks at the plant location to provide loading of all three products. A railway spur with a 10-car loading rack and facilities for truck loading are located approximately 2 miles from the plant at a point where railway and highway parallel. The lines are buried to prevent vaporization and gas lock from sun temperature. The lines are all somastic coated and are buried from 10 to 12 ft. deep at the Santa Clara River crossing. Communication between loading rack and absorption plant is by telephone.

Fire system.—A 6-in. fire line looping the outer edge of the plant area provides water to reach any area of the plant with fog nozzles. Live reels with chemical hose and fog nozzles attached are provided at short intervals about the plant for quick use on small fires. Fog rifle nozzles on large hose are available for cooling down an area. Auxiliary storage tanks and two Chrysler 500-g.p.m. fire pumps are installed for emergencies requiring large quantities of high-pressure fog. Auxiliary dry chemical extinguishers are located throughout the plant. Fire blankets are available and portable foam-generating equipment is kept ready for use.

Compressor plant.—This portion of the Newhall Potrero layout employs 6,000 installed horsepower (15 units) to handle both wet and dry gas. Six of the 15 compressors boost low-pressure wet gas from the 60-psi. and from the 175-psi. systems to 450 psi. for absorption. The other nine compress in two stages the absorber dry gas from 425 to 2,000 psi. for reservoir injection system. High interstage serves the gas-lift system.

The compressor plant features complete air cooling with engine-driven air fans on jacket water, oil-cooling water, and interstage gas cooling. The coolers in like service are all joined by a common header to provide greater operating flexibility and to permit a system of preventive maintenance on gas engines without having to shut down the large units.

Automatic controllers attached to engine throttles on jacket-water coolers maintain jacket-water temperatures within narrow limits.

A back-to-back arrangement of the 600-hp. angle-type compressors provides the shortest travel pattern for operating personnel, promotes a stabilizing effect to the pile-supported foundations, and provides a uniform advance front for plant expansion. Width of the coolers and the space occupied by engines and foundations are designed to match and the cooler capacities are engineered for the 600-hp. compressors unit for unit.

The Wiggins Lodek Floating Roof

. . . designed specially for the storage of corrosive oil products. The entire under surface being in complete contact with the tank contents, no vapors are trapped or can collect beneath the roof.

The basic exclusive conservation features of the Hidek Roof including the triple seal and extra large pontoons are retained.

WIGGINS CONSERVATION STRUCTURES

Hidek Floating Roof
Dry Seal Lifter Roof
Improved Breather Roof
Lodek Floating Roof
Dry Seal Gasholder
Improved Balloon Roof

Write for bulletin FR-3 which gives further details on Wiggins Lodek Floating Roofs.

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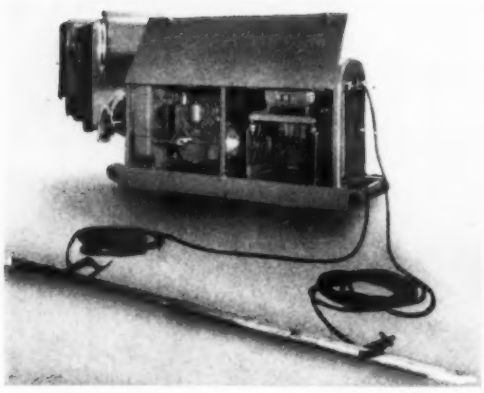
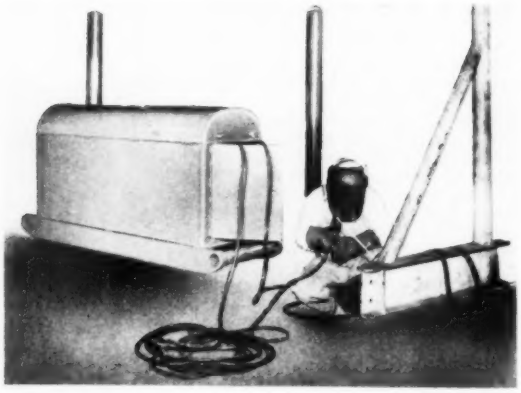




The burnoutproof feature of the generator shown above makes it adaptable to such short-circuit use as thawing frozen pipes and for heavy-duty welding

Rig Electric Unit Performs Threefold Service Duty

AN electric generator with a single solid moving part is an interesting development in auxiliary applications in the oil industry. Brushes, slips rings, and commutator, common on conventional alternating-current generators, are eliminated in this machine. Skid-mounted, gasoline-engine-powered units (manufactured by Midwestern Engine & Equipment Co.) have been field tested and are in use by Mid-Continent drilling contractors for the three-fold purpose of rig lighting, welding, and pipe thawing.

The only moving part in this generator is a one-piece, permanent-magnet rotor. The stator or armature, of all-welded construction, is wound with 5/16-in. copper, silver-soldered at the joints. These features, coupled with the electrical characteristics of the generator, make it burnoutproof. The armature winding will carry three times normal rated output of the generator. Under short-circuit load, with a 10° F. increase in armature-winding temperature, magnetic leak will limit temperature increase and will prevent any further increase in temperature and prevent damage from the temperature rise.

The rotor of the unit provides a revolving magnetic field for electric generation. This field is set up and maintained by a permanent magnet, which has previously been demagnetized to a low permanent value by short-circuit loading of the generator. By this means the output of the generator remains nearly constant under load.

The magnet is held in place in the rotor by two pole pieces. It is balanced to limit vibration by drilled holes, and is ventilated by grooves in the rotor. Bearing housings are of cast aluminum because of that metal's nonmagnetic properties and high heat-dissipation rate. A transformer assembly is furnished with the generator unit (manufactured by Allmand Bros. Manufacturing Co.) to provide required voltage variations.

Because the armature is stationary and the rotor is a permanent magnet, and since there is no contact between the two, the generator is nonsparking, making the unit desirable for use in a hazardous gas-filled atmosphere. Since it requires no excitation, it requires less driving power than conventional small alternators. Within limits, it is automatically self-regulating and cannot burn out because of the limited value of armature current.

The burnoutproof feature makes it possible to use this unit in applications where short-circuit loads or high overloads are applied—some of these being thawing of frozen pipes, and heavy welding and cuttings.

Stage Separation

(Continued from page 80)

ous programs, the sum is constant to plus or minus 0.4 per cent. The increase in atmospheric oil volumes with increase in number of stages is due mostly to the retention of natural-gasoline fractions. The real loss, therefore, from a program of two few stages is in natural gasoline, recoverable on the lease.

Current natural-gasoline prices are such that there is no incentive to keep stabilized natural gasoline separate from crude oil; the stabilized natural gasoline is often mixed and transported with crude oil. In this instance, if the gasoline plant is operating on vapors from field separators, there is no incentive for a stage-separation program except the feature of having a larger portion of the field vapors available at higher pressures. If the gasoline plant is furnishing its dry gas to a gas line at elevated pressures, compression costs are reduced by the employment of stage separation in the field.

To illustrate the use of stage separation in the conservation of vapor compression horsepower, assume that three gathering systems are operating at 500, 100, and 0 psig. between the field and the plant. The volumes of vapors available, together with their gasoline contents, for programs of various numbers of stages are set out

BASIS: One Barrel of Atmospheric Oil

Number of stages in program	Volume of available vapors to feed systems at			Gasoline content (g.p.m.) of available vapors to feed systems at		
	500	100	0	500	100	0
1	0	0	1,330			4.4
2	940	0	275	0.95		11.0
3	908	0	221	0.95		7.1
4	902	120	89	0.95	2.71	11.5
5	899	89	95	0.95	1.45	8.2

Stock Tank Oil Considerations

With volume increases in atmospheric oil, obtained by stage separation, there is an increase in oil gravity. Below atmospheric oil gravities are shown for programs of varying numbers of stages:

No. of stages	Atmospheric oil gravity °A.P.I.
1	46.0
2	49.5
3	52.8
4	54.1
5	54.7

The atmospheric oil-gravity increase might or might not be important, depending on whether gravity premiums are paid, and if so, if the increase crosses a premium boundary. Where the increased gravity does cross a premium boundary, the stage-separation program will pay out much more quickly, premiums being in the magnitude of a per cent or two.

All tank oil, whether produced through one or several stages, is in equilibrium with the tank vapors; volumes will maintain if temperatures do not rise, and tanks are not allowed to "breathe." Actual tests run on flashed and staged tank oils indicate that "weathering" produces rather uniform losses over the staged and flashed oils. If subjected to severe weathering, the staged tank oils will lose volume and gravity somewhat more rapidly than the flashed tank oils, but even so a large percentage of the advantage gained by staging is retained.

Greatest operational difficulties in a stage program are encountered in the regulation of the stages. Both liquid-level control and gas back-pressure regulation are important. It is particularly necessary to hold uniform back pressure on the stages. If the pressure on a stage is allowed to fluctuate, all of the oil in the separator at the time of loss of pressure is flashed and the advantage of proper pressures between stages is lost. As is indicated in Fig. 3, volume of vapors from the lower stages is quite low even at high production rates, and leaky back-pressure valves will allow the pressure to bleed below that desired.

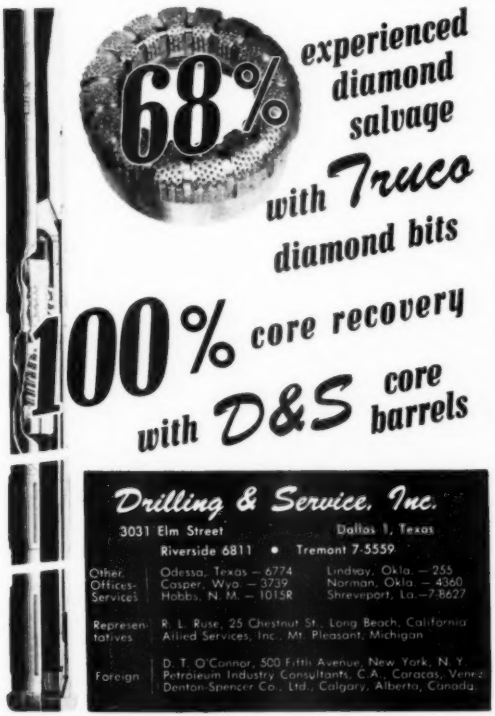
Choice of First-Stage Pressure

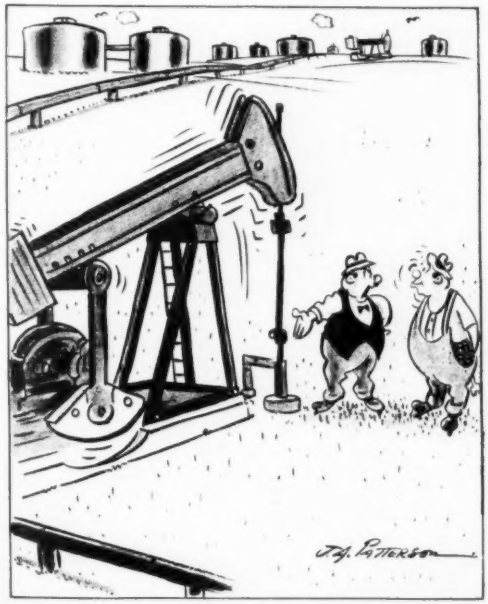
Complete treatment of optimum pressures for maximum recovery of "distillate" producing wells and some oil wells can be found in recent technical publications. A great deal of the laboratory work has dealt with equilibrium liquid-vapor ratios. Optimum pressures for the condensation of "distillate" in the separator do not coincide with optimum pressures for recovery of tank oil. Twelve hundred pounds pressure is a sound average for maximum condensation in the first-stage separator, but a large part is methane and ethane and not recoverable as tank liquid. Optimum first-stage pressure for both high-pressure flowing oil wells and distillate wells is in the order of 750 lb. for maximum recovery from a two-stage program. Increasing the number of stages raises the optimum pressure as is indicated in Fig. 4.

BOOKS

INDUSTRIAL CHEMISTRY. By E. Raymond Riegel. Published by Reinhold Publishing Corp., 330 West 42nd Street, New York. 1015 pp. $7.

This is the fifth edition of this work, the fundamental purpose of which is to give the reader a picture of an industry, process, or installation, such as might be taken away after a personal visit in which all operations are studied, from basic chemical reactions to finished products. To this nucleus there is added a broader description of each. The new edition has been largely rewritten, expanded, and brought up to date. New material not included in the previous edition includes antibiotics, the new organic insecticides and fungicides, the utilization of wood, novel methods of the application of dyes to fiber, atomic energy, and recent developments in plastics and petroleum. The volume is a valuable reference book for chemical technologists and specialists.





THE OIL AND GAS JOURNAL

"Blast it, Snodgrass, which are you doing? Agreeing with me or just watching this pump!"

PROGRESS in METALS

by W. L. Nelson
Consulting Engineer

Flame Hardening of Large-Diameter Bearings

SPECIAL large bearings involving such features as (1) very thin large-diameter sections, (2) accurately spaced drilled and tapped holes, (3) integral gears, (4) thin flanges, etc., cannot be adequately handled with conventional materials and procedures. Kaydon Engineering Corp., of Muskegon, Mich., has developed a precision deep-flame-hardening technique which has been successfully employed for such large bearings as the one shown in Fig. 1. The new method is described in a six-page booklet. Of course, soft materials (35-40 Rockwell "C") can be employed, but these wear too rapidly. Likewise, carburizing can be used but large furnaces are required, thin sections may warp, and the cost is high.

The new technique is a true deep-flame hardening—not the ordinary type of skin-hardening which is insufficient for even lightly loaded bearings.

The metallurgical principles involved in flame hardening are the same as with conventional methods of hardening. All the usual precautions must be observed—selection and quality of material, and so forth. Response to flame hardening is usually a little better than would normally be expected for surface hardness and depth of hardening.

For large-diameter bearing elements, the progressive method is employed. This embodies the progressive movement of the work past a stationary heating and quenching device, or in some instances, the reverse of this, with stationary work and a progressive movement of the heating and quenching apparatus. The work is supported and rotated by means of a group of rollers. Thus the diameter of the work to be flame hardened is limited only by the floor space available and the time required to traverse the entire circumference. Rings of 80-in. diameter have been treated as efficiently as those of 20-in. diameter.

Rapid Heating Rate

Very rapid rates of heating are possible with oxygen-acetylene flames. The time element is short, 3 to 6 in. per minute being heated, and a high-pressure spray quench follows immediately, so that little or no scaling or decarburization occurs. Surfaces are clean, uniformly hard, and a very minimum of stock needs to be removed in grinding. Insert or plug-type tips have been employed. These have the advantages of better flame characteristics and greater versatility than the older drill-face type of heating head. By varying the tip sizes (hole diameter), length, and spacing arrangement, almost any desired pattern of surface contour and depth of hardness may be attained with a minimum number of standard heads. About 0.16 cu. ft. of each gas are required per square inch to ⅛-in. depth of hardening.

Rings to 30-in. diameter, of ¼-in. cross-section, have been treated with less than 0.010-in. distortion, out-of-roundness, and out-of-flatness. Rings to 80½-in. diameter have been treated with maximum out-of-roundness of 0.030 in., and out-of-flatness of 0.025 in., even though the cross-sections were complicated with holes, slots, gears, etc.

Service stresses imposed upon antifriction bearings are among the highest of any conventional engineering structures. Metallurgical characteristics developed by flame hardening have proved eminently suitable. The uniformly high surface hardness resists brinelling and wear. Beneath this hard surface layer is a gradation or transition zone of intermediate hardness which bonds the hard case to the tough core and provides a cushion for the hard case, permitting some elastic deformation of the case under load, without danger of spalling or flaking. This zone may be varied as required for a particular service, by adjustments of the rate of heat input, time lag before the spray quench, and intensity of the spray quench. Further variation is obtained by selection of quenching media, for instance, brine, water, soluble oil, or mineral oil.

The overlap or junction between start and end of the flame-hardening cycle has long been a major detriment to the application of flame hardening to bearing races by the progressive method. Now, suitable devices and controls have been developed which hold this zone within about ¼-in. average width (less in many cases) and with an average loss of hardness of only about 10 points Rockwell "C" scale.

The flame-hardening development is of particular importance to engineers in allowing them to reduce weight to a minimum by eliminating many conventional parts such as separate gears, end covers, housing, and cartridges. These bearings can be made with gears as an integral part of the race, the bearing completely sealed, and with flanges drilled or tapped for direct mounting to other structures, thus simplifying the design and greatly reducing the bearing section and weight.

Fig. 1—View of 80½-in. o.d., 68½-in. i.d. bearing which includes integral gear teeth, seals, and flanges, with drilled and tabbed holes, all made possible by the new technique of deep-flame-hardening

Long-Life Water Pumps

THE service afforded by Ni-Resist water pumps for the City of Wichita, Kans., may not be representative of the severe services encountered in some petroleum services, but such an excellent performance is worthy of close attention. Centrifugal pumps equipped with Ni-Resist bowls and impellers were installed in 1940 and each pump has since pumped over 1¾ billion gallons of water in continuous service. The rate of delivery had not materially decreased in 1949, and only the bushings and wearing rings needed replacement.

Forging Terms or Operations

EXTRUDING

In making beams, structural shapes, intricately shaped strips, etc., the metal is forced through a die which continuously forms it into the desired cross-section. An extrusion press is used for this operation.

Initial Producing Gas-Oil Ratio for Reservoir Estimations

THE producing gas-oil ratio of a well at the time of completion is often a useful quantity for estimating the relative amounts of production from two separate zones or the relative sizes of liquid and gas zones from which the production stream issues. The calculation is based on the generally conceded fact that the initial production from a reservoir liquid zone will be at the solution gas-oil ratio.

When a reservoir liquid zone is first tapped there is no gas space in the zone to permit gas flow and the liquid which moves into the well bore is at original reservoir pressure. For these two reasons, oil production occurs at the initial solution gas-oil ratio. This fact is often used to check the accuracy of bottom-hole-fluid sample data and is used as a basis for recombining surface separator samples in the correct liquid-gas ratio for P.V.T. analysis. When the initial producing gas-oil ratio is greater than the solution ratio, production from a free gas zone, i.e., a gas cap, is indicated.

Two Liquid Zones

Consider first the situation where a well penetrates two separate liquid zones and produces oil from both in a common surface stream. This situation is encountered where formation conditions will not permit the mechanical separation of zones within the well or where economic reasons dictate the simultaneous production from several common sources. Let it be considered that the two liquid zones contain liquid with solution gas-oil ratios designated as r_1 and r_2 standard cubic feet per stock-tank barrel.

Let the initial rate of oil production from Zone 1 be Q_1 and from Zone 2 be Q_2. The rates of gas production from the zones are r_1Q_1 and r_2Q_2 if each produces at its solution gas-oil ratio. The average producing gas-oil ratio, R, is the total gas rate divided by the total oil rate, or:

$$R = \frac{r_1Q_1 + r_2Q_2}{Q_1 + Q_2} \qquad (1)$$

This can be rearranged to read:

$$\frac{Q_1}{Q_2} = \frac{r_2 - R}{R - r_1} \qquad (2)$$

From this equation the individual quantities Q_1 and Q_2 can be evaluated, because their sum is the total oil-production rate.

Many Unknowns Present

For the situation where the well penetrates and produces from more than two liquid saturated zones, each having liquid with a different solution ratio, too many unknowns are present to permit a determination of the individual rates. The equation for the average producing ratio can, however, be stated as follows:

$$R = f_1r_1 + f_2r_2 + f_3r_3 + \ldots + f_nr_n \qquad (3)$$

where $r_1, r_2 \ldots r_n$ represent the solution gas-oil ratios of the separate zones and $f_1, f_2 \ldots f_n$ are the fractions of the total surface oil production rate being produced from each zone. The sum of all f values is unity.

The initial producing gas-oil ratio, when greater than the solution gas-oil ratio, can be used to indicate the relative size of the free gas zone in the reservoir. This estimation is based on the assumption that the oil and gas are produced from homogeneous porous sections of identical characteristics.

If the producing ratio is R and the solution gas-oil ratio is r_s, the quantity $(R - r_s)$ represents the amount of surface gas that is produced from the free gas zone. Within the reservoir this quantity will be equal to $(R - r_s)\,v_s$ where v_s is a conversion factor from standard cubic feet to barrels of reservoir space at the reservoir pressure.

The flow of gas from the reservoir into the well can be represented by Darcy's law in the form:

$$(R - r_s)\,v_s = \text{Const.}\,\frac{k_g\,h_g\,d_p}{\mu_g\,d_r} \qquad (4)$$

The surface oil-producing rate is Q_o and the reservoir rate is $Q_o\beta_o$ where β_o is the formation volume factor at original reservoir pressure. The flow of this oil from the reservoir into the well can be represented as:

$$Q_o\beta_o = \text{Const.}\,\frac{k_o\,h_o\,d_p}{\mu_o\,d_r} \qquad (5)$$

In the above equations h_g and h_o represent respectively the footages of formation gas zone and oil zone respectively. The ratio h_g/h_o is then a measure of the relative size of gas cap.

The situation being considered occurs when the reservoir is first penetrated and allowed to produce. Both the oil and gas zones can be considered to be fully saturated except for the common amount of connate water. The effective permeabilities k_o and k_g can then be considered to be equal since both the gas and oil are nonwetting fluids. If it is also assumed at this time of initial production that the pressure gradients within the gas and oil zones are equal, then division of Equation 4 by Equation 5 gives:

$$\frac{(R - r_s)\,v_s}{Q_o\,\beta_o} = \frac{h_g\,\mu_o}{\mu_g\,h_o} \qquad (6)$$

or

$$\frac{h_g}{h_o} = \frac{(R - r_s)\,v_s\,\mu_g}{Q_o\,\beta_o\,\mu_o} \qquad (7)$$

Without going through the formality of Darcy's law, an estimation of relative gas-cap size could be based upon the assumption that the gas and oil zones produce initially in direct proportion to the total volume of each zone. This assumption leads to Equation 7 without the viscosity terms.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

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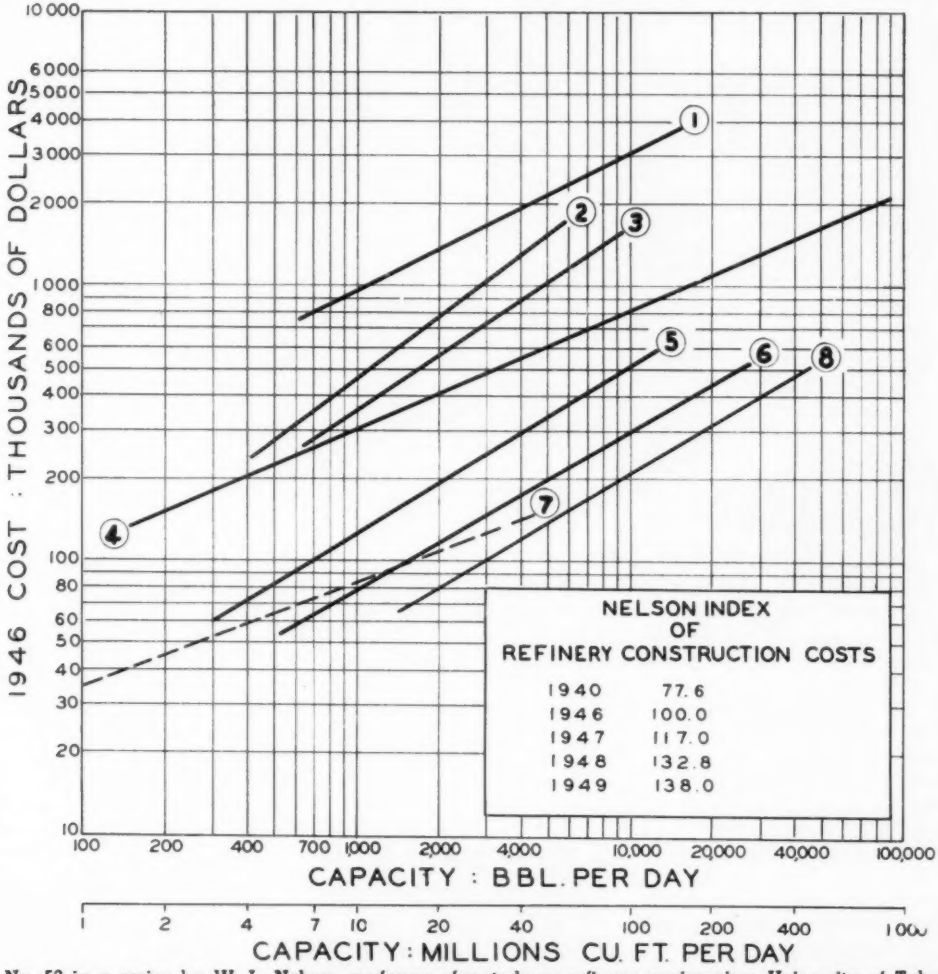
Cost-imating

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Over-All Plant Costs—Distillation, Etc.

(Approximate)

Curve No.	Kind of plant	Maximum error (per cent)	Basis	Notes
1	Natural gasoline	52 to 176	10⁶ cu. ft.	Mainly in fields—not refineries
2	Solvent dewaxing	54 to 154	Bbl. per day	Mainly methyl ethyl ketone
3	Solvent extraction or treating	57 to 185	Bbl. per day	All types incl. propane deasphalting
4	Hypersorption		10⁶ cu. ft.	
5	Vacuum distillation	68 to 150	Bbl. per day	Several lube products
6	Topping only	46 to 190	Bbl. per day	Not a complete topping refinery
7	Hydrogen-sulfide removal	80 to 130	10⁶ cu. ft.	
8	Vacuum flash	62 to 120	Bbl. per day	Cat. feed preparation, asphalt, etc.



No. 59 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

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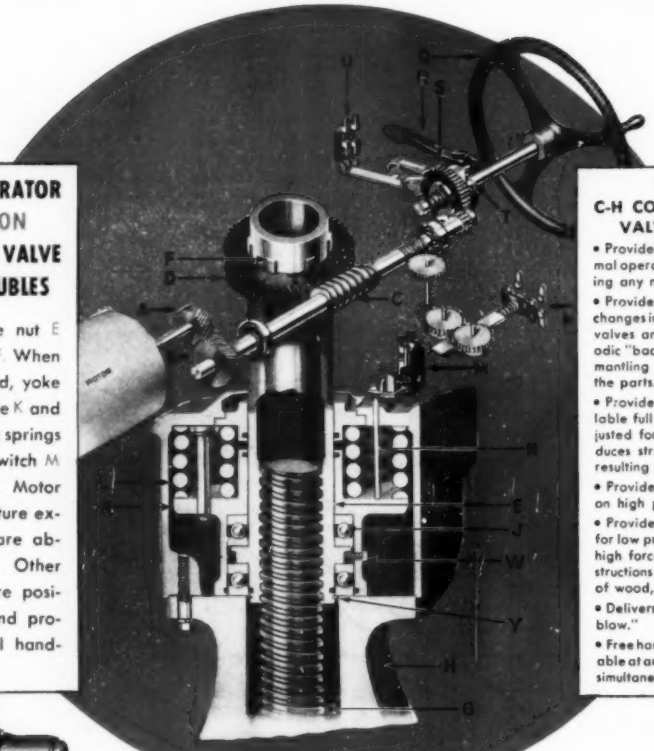
Motor drives yoke nut E thru A, B, C, D and F. When valve disc is seated, yoke nut rises, lifting plate K and rod N, compressing springs L and operating switch M which stops motor. Motor drift, and temperature expansion of stem, are absorbed in springs. Other elements shown are position limit switch and provision for optional hand-wheel operation.



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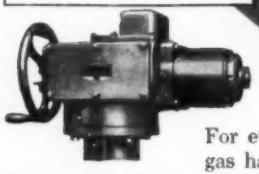

For every problem of oil and gas handling from production through the refining processes and out across the pipe line networks, the *controlled thrust* principle of Cutler-Hammer Motorized Valve Operators gives these definite advantages for all kinds of valves:

It *always* assures a tightly seated valve regardless of the frictional condition of the valve stem or the driving mechanism.

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PIPE LINES

Louisville Transmission Purchase Is Authorized

Purchase and acquisition by Louisville Gas & Electric Co., and sales and transfer by Louisville Transmission Corp. (of Kentucky) of all the latter firm's properties, has been authorized by Federal Power Commission.

FPC also authorized Louisville Gas to acquire from Louisville Transmission all the outstanding shares of capital stock, amounting to $10,000 total par value, and a $320,000 mortgage note of Louisville Transmission Corp., an Indiana corporation which is a subsidiary of Louisville Transmission, the Kentucky corporation.

Louisville Transmission's properties include a 66-mile transmission line extending from Transmission's substation at Louisville Gas & Electric's Paddy's Run plant, near Louisville, to a connection with the Tennessee Valley Authority in Hart County, Kentucky; a .41-mile line from Transmission's substation to the Kentucky-Indiana state line; a .94-mile line from Louisville's Ohio Falls substation to Transmission's Canal substation in Louisville; and Transmission's substations located at Louisville's Paddy's Run and Canal plants.

FPC Examiner Approves New United Gas Co. Line

United Gas Pipe Line Co.'s proposal to construct 105.6 miles of 20-in. loop line in Louisiana has been recommended for approval by Ewing G. Simpson, Federal Power Commission, presiding examiner.

The new line would increase the company's capacity for delivery of natural gas to Mississippi River Fuel Corp. by 122,000,000 cu. ft. daily to a total of approximately 195,000,000 cu. ft. daily. The line will cost $5,113,300.

Paralleling United's existing 24-in. Carthage, Tex.-Sterlington, La., pipe line, the new line will commence in DeSoto County, Louisiana, near the Texas state line and extend easterly to a point in Ouachita County, near Monroe, La. The loop will increase daily delivery capacity of the Carthage-Sterlington pipe line to 432,000,000 cu. ft.

FPC last month gave United temporary authority to begin construction of the loop. It had asked for this authority after Mississippi River Fuel had requested that United increase its gas deliveries to it. Under a gas-delivery contract with United Mississippi River Fuel could ask for more gas.

Unless FPC enters an objection to the examiner's decision, it will become an order of the commission.

United Awards Contracts For New Gathering System

HOUSTON.—Brown & Root, Inc., Houston, has been awarded a contract to build a $1,000,000 gas-gathering project in DeWitt and Goliad

D. L. Rankin, right, Chicago, manager of the products pipe-line department, Standard Oil Co. (Ind.) presents S. E. Brown, Dubuque, Iowa, center, a special award for having worked the entire time in that department since it was established 10 years ago. He also received a 20-year service pin. R. T. Scott, Rochelle, Ill., division superintendent, is at left

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counties for United Gas Pipe Line Co.

Thirteen gas and oil fields between Yorktown and Goliad will receive their first major gas outlet with completion of the project. W. W. Clopton, San Antonio district manager for United, announced that 34 miles of gathering lines, a dehydration plant, and 12 miles of 16-in. will be built to connect the firm's existing main transmission lines leading to San Antonio and Austin.

Six million cubic feet of the initial withdrawals of 30,000,000 cu. ft. will be flare gas. The planned capacity of the lines is 100,000,000 cu. ft. Fields from which gas is being collected include Pena, Slick, Boyce, Cabeza, South Cabeza, Albrecht, Poehler, Melrose, East Melrose, West Weesatche, South Weesatche, Breeden, and Brandt.

Montana Power to Begin Work on New Gas Line

Montana Power Co. will begin construction next spring of an 83-mile natural-gas transmission line connecting Butte and Bozeman which will bring gas service to four southwestern Montana cities for the first time.

F. W. Bird, president and general manager of the company, said the project, first major gas-transmission construction by the firm since 1931, will result in interconnection of the company's east and west systems, will improve continuity of service to the present areas being supplied with natural gas, and will bring service to a new and growing area of the state for the first time.

"Construction of the Butte-Bozeman line is a major step in the Montana Power Co.'s constantly moving program to expand natural-gas facilities in the area it serves," Bird said. "The area between Butte and Bozeman is growing rapidly and we are anxious to keep step with this growth and progress."

The 83-mile, 12¾-in. welded line will cross the main range of the Rocky Mountains just east of Butte, and will cross the Jefferson, Madison, and Gallatin rivers. Contracts will be let for construction in the near future, and work is expected to start early next spring and be finished during the summer. Service will be available to the new areas during the winter season of 1950-51.

With completion of this project, Montana Power Co. will have more than 300 miles of main-transmission lines between its natural-gas fields at Cut Bank and Dry Creek. The west system now includes 200 miles of 20-in. line between Cut Bank and Butte, and the east system consists of 116 miles of 10-in. between gas fields at Dry Creek, 7 miles east of Red Lodge, and Bozeman.

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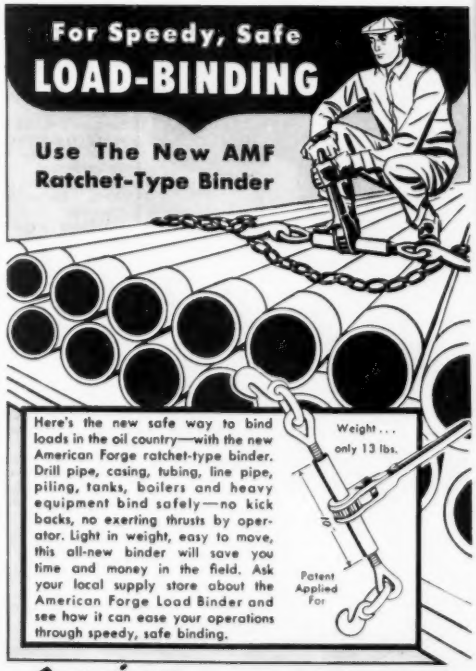

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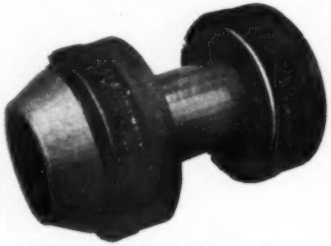

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Pipe-Line Construction

FOLLOWING is a tabulation of pipe-line projects, both domestic and foreign, which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines—Domestic

Atlantic Pipe Line Co.—420 miles 10-in., under construction, Crane to Harbor Island, Tex.; Evans & James, contractor; Montgomery Trucking Co., stringing contractor; J. M. Beavers, superintendent. 50 miles 10¾-in. under way, Rockspring-Sonora, Tex.; H. B. Zachry Co., contractor; spread office, Rocksprings; Guy C. Lamon, superintendent.

Humble Pipe Line Co.—375 miles 18-in., planned, West Texas-Satsuma Station to Baytown, Tex.

Mid-Valley Pipe Line Co. (Sun and Ohio).—1,000 miles 20-22-in., planned, Longview, Tex., to Mayersville, Miss.-Covington, Ky., to Lima, Ohio. Contracts let for 857 miles, as follows: Section 2, Haynesville, La., to Mayersville, Miss., Latex Construction Co.; spread office, Bastrop, La.; F. A. Silar, general superintendent; W. A. Briley, spread superintendent; office at Eudora, Ark., W. H. Hayes, superintendent; M. L. Thompson, assistant superintendent. 41 miles 12-in., lateral, Delhi to Lake Providence, La.; headquarters, Lake Providence; E. C. Norris, general superintendent; R. E. Thornton, superintendent. Section 3-A, Mayersville to Oakland, Miss., Associated Pipe Line Contractors, Inc.; J. A. Williams and L. H. Gray, spreadmen; Section 3-B, 4-A, Oakland, Miss., to Henderson, Tenn., Eastern Construction Co.; Section 4-B, 5-A, Henderson to Clarksville, Tenn., Eastern Construction Co.; Section 5-B, 6-A, Clarksville, Tenn., to Elizabethtown, Ky.; Britton Construction Co.; Section 6-B, Elizabethtown to Hebron, Ky., H. L. Gentry Construction Co.; Section 7 South, Hebron, Ky., to Eaton, Ohio, Britton Construction Co., spread office, Hamilton, Ohio; spreadman, Fred Peters; Section 7 North, Eaton to Lima, Ohio; Section 8, Magnolia, Ark., to Haynesville, La.

Phillips Pipe Line Co.—54 miles 8-in., under construction, Thrall to Kansas City, Kans.; Morrison-Wilson-Anderson Brothers, contractors.

Portland Pipe Line Co., Montreal Pipe Line Co., Ltd.—234 miles 18-in., planned, Portland, Me., to Montreal, Que., Canada, contracted as follows: Oklahoma Contracting Co., 85 miles in Section 1 at southern end; Associated Pipeline Contractors, Inc., Section 2, 81 miles; and Fred Mannix & Co., Ltd., 68 miles, Section 3, in Canada.

Richfield Oil Corp.—40 miles 10-in. Cuyama Valley-Newhall, Calif., planned; Bechtel Corp., contractor; central plant, Watson, Calif., 60 miles 14-in. applying field joints, Newhall-Wilmington, Calif.; under way; Bechtel Corp., contractor.

Shell Pipe Line Corp.—190 miles 10¾-in., take up, Cushing, Okla., to Emmitt, Mo.; under way; Trojan Construction Co., Inc., contractor; spread office at Mount Vernon, Mo.; Maurice W. Crawford, spreadman.

160 miles 10¾-in., Cushing, Okla., to Elk City, Okla.; under construction; Trojan Construction Co., Inc., contractor; spread office, El Reno, Okla.; Swede Tillotson, spreadman.

Skelly Oil Co.—35 miles 8-in., Valley Center to El Dorado, Kans.; under construction; Bishop & Lock Construction Co., contractor; spread office, Wichita, Kans.; Barry Hall, spreadman.

40 miles 8-in., reclaim, Burrton to El Dorado, Kans.

Stanolind Pipe-Line Co.—31 miles 10-12-in., under construction, Elmont and Blaine Stations, Kans., loops; C. S. Foreman, contractor.

Sun Pipe Line Co.—61 miles 4-10-in., authorized, Seabreeze to Sun Station, Tex.

Texas-Empire Pipe Line Co.—40 miles 16-in., authorized, Wilmington, Ill., to East Chicago, Ind.

Texas-New Mexico Pipe Line Co.—61 miles 10-in., authorized, Colorado City to Borden County, Texas. Contracted as follows: 40 miles 10¾-in., Borden County to Colorado City pump station, Scurry County, Carl H. Dunn; 16.06 miles 6⅝-in., and 5.41 miles 4½-in., Borden and Howard counties, Wright Construction Co.

Products Pipe Lines—Domestic

Buckeye Pipe Line Co.—140 miles 8-in., Speedway City, Ind., to Lima, Ohio; under construction; H. L. Gentry Construction Co., contractor; spread office, St. Marys, Ohio; Frank Morris, spreadman.

Great Lakes Pipe Line Co.—52 miles 15-in., Albert Lea to Fairbault, Minn.; under construction; Sheehan Pipe Line Construction Co., contractor; spread office, Albert Lea, Minn.; C. W. Henderson, spreadman.

165 miles 12-in., Irvington, Neb., to Sioux Falls, S. D., planned.

Phillips Petroleum Co. and Shamrock Oil & Gas Co.—152 miles 6-in., planned, La Junta to Denver, Colo.

Salt Lake Pipe Line Co.—320 miles 8-in., under way, Salt Lake City to Boise, Idaho, Smith Contracting Co., spread office, Ogden; C. C. Craig, spreadman; Oklahoma Contracting Co., Grafe-Callahan Construction Co., contractors.

242 miles, 6-8-in., Boise, Idaho-Pasco Wash., planned. 120 miles 8-in., Salt Lake refinery toward Boise, Idaho; railroad plant at Ogden, Utah; Leon Garrott, superintendent; Bechtel Corp., contractor.

Sinclair Refining Co.—130 miles, all sizes, take up and recondition, Bristow, Okla., area; Atlas Construction Co., Inc., contractor; Frank M. Mahan, in charge.

Standard Oil Co. (Ohio)—38 miles 8-in., under way, Toledo to Fostoria, Ohio; Britton Construction Co., contractor; Fred Peters, superintendent; spread office, Woodville, Ohio.

Natural-Gas Pipe Lines—Domestic

Alabama-Tennessee Natural Gas Co.—80 miles 10-in., planned, from Tennessee Gas Transmission Co. line near Selmer, Tenn., to Tuscombia, Ala.; Lehman-Hoge & Scott, contractor.

61 miles 6-8-in., planned, Huntsville to Tuscombia, Ala.

80 miles 11-in., under construction, Selmer, Tenn., to Muscle Shoals, Ala.; Lehman-Hoge & Scott, contractor.

36 miles 6-8-in., authorized, Muscle Shoals to Decatur, Ala.

Arkansas Louisiana Gas Co.—162 miles 20-in., under construction, Waskom, Tex., and Perla, Ark.; Anderson Brothers Co. Latex Construction Co., contractors. (91 miles 20-in. contracted to Latex, 60 miles completed. Spread office, Magnolia, Ark.; H. L. Leake, spreadman.)

70 miles 20-in., under construction, Waskom, Tex., to Magnolia, Ark.; Anderson Brothers, contractor.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.)—1,530 miles, planned, Alabama Florida-Georgia-South Carolina.

Atomic Energy Commission (U. S. Government)—95 miles 12-in., under construction, Bloomfield to Los Alamos, N. M.; Morrison-Haddoc Engineering Co., contractor.

Central Hudson Gas & Electric Corp.—40 miles, planned, Tuxedo, N. Y., station,

Home Gas Co. line now under construction, to Poughkeepsie, N. Y.

Central Kentucky Natural Gas Co.—38 miles 12-20-in., planned, Kentucky loops.

Chicago District Pipe Line Co.—41 miles 24-in., planned, Joliet, Ill., to Chicago.

City of Indianapolis, Ind., Inc.—55 miles 16-in., proposed, Indianapolis to Texas Eastern Transmission Corp.'s system.

Coast Counties Gas & Electric Co.—40 miles 3-4-8-in., planned, coast and valley region, California.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Colorado Interstate Gas Co.—38 miles 20-in., planned, Texas Panhandle and Hugoton field, Kansas, to Denver, looping. Cheek Construction Co., contractor; Troy Cheek, superintendent.

Colorado-Wyoming Gas Co.—41 miles, planned, Greeley, LaSalle, and Windsor, Colo., areas.

Commonwealth Natural Gas Corp.—537 miles 20-in., planned, West Bend, Ky., to Norfolk, Va.

200 miles, planned, Green County, Virginia, to Norfolk.

Consolidated Gas Utilities Corp.—41 miles 12-in., planned, Enid-Blackwell and Marlow-Cement, Okla.

Egyptian Natural Gas Co.—80 miles 6-8-in. planned, Norris City to Salem-Centralia, Ill., areas.

East Tennessee Natural Gas Co.—398 miles 3-16-in., planned, Nashville-Chattanooga-Knoxville, Tenn., and lateral lines.

172 miles 22-in., under construction, Greenbrier, Tenn., to Oak Ridge; Oman-Fulton & Brodie, contractor. Office, spread 1, Cookeville, Tenn.; H. P. Crawford, spreadman. Spread 2 office, Crossville, Tenn.; A. A. Carrigan, spreadman; spread 3 office, Harriman, Tenn., M. L. Boyd, spreadman; J. T. Brodie, general superintendent.

185 miles, 16-in., Lobelville-Chattanooga, Tenn., contracted by Walters & Saigh Con. Co. for construction in 1950; 120 miles, 12-in., Chattanooga - Knoxville, Tenn., contracted by Walters & Saigh Con. Co. for construction in 1950; 100 miles of laterals to be laid in 1950. Construction 150 miles, 16-in., Knoxville-Bristol, Tenn., under consideration.

El Paso Natural Gas Co.—91.3 miles planned, Almagordo, N. M., to Willcox, Ariz.

105 miles 24-in., planned, Upton County, Texas-Jal, N. M., all work by company crews.

103 miles 26-in., planned, Crossover South to Topock, Ariz.

450 miles 30-in., under construction, Eunice, N. M.-Blythe, Calif., looping.

451 miles, 24-in., planned, Farmington, N. M. (San Juan basin)-Topock, Ariz.

270 miles, planned, laterals for San Juan project.

Gulf Oil Corp.—40 miles 3-24-in., under construction, Eunice, N. M., gathering system and gasoline plant; Younger Construction Co., contractor.

Gulfcoast Northern Gas Co.—Gulf Coast area, proposed, to Illinois.

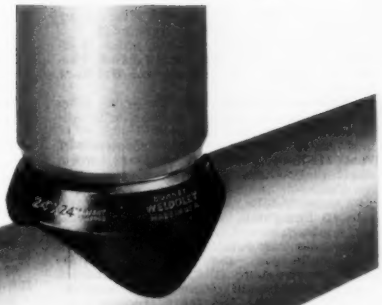
Home Gas Co.—70 miles, planned, Orange Sullivan-Rockland counties, New York-Cattaragus County, New York, areas.

Jersey Central Power & Light Co.—39.4 miles 10-in., planned, New Jersey to Coast system, Texas Eastern Transmission Co.'s Big Inch.

Kansas-Nebraska Natural Gas Co., Inc.—301 miles, authorized, Kansas-Nebraska area, including the following contracted to Rumsey Brothers Pipe Line Construction Co.: 10 miles 12¾-in., replacing 8-in. in Alma-Holdredge, Nebr., line; 7 miles 8⅝-in. and 44 miles of 6⅝-in., Elm Creek to Loup City, Nebr.; 18 miles 4½-in., and 18 miles 3½-in., Litchfield to Broken Bow, Nebr.; and 10 miles 6⅝-in., Red Cloud to Guide Rock, Nebr.

Magnolia Petroleum Co.—70 miles, all sizes, gathering system for gasoline plant; Pipe Line Service Co., contractor; field office, Healdton, Okla.; G. Pack, spreadman.

35 miles 4-5-in., under construction; gathering system for gasoline plant; Pipeline



WeldOlets, Butt Welding — Available as standard, with outlet sizes from ⅛" to 24", both straight and reducing for use with Schedule 40 pipe up to 12" outlet. Outlet sizes 12" - 24" for standard weight pipe 4⅜" wall). Also available for Schedule 80 services through 8" outlet and extra strong through 24" outlet size (for use with pipe having ½" wall).

You write

SPEED, ECONOMY AND FULL PIPE STRENGTH

***into the job when you specify* WELDOLETS**

With WeldOlet branch pipe welding fittings you provide the quickest, most economical, most satisfactory method of obtaining full pipe strength at branch connections.

Note in the above illustration how the WeldOlet tapers to provide a single bevel groove joint at the crotch section and blends into a V-butt joint at the ear portion.

WeldOlets need no additional reinforcement to establish and fully maintain original strength on ASTM A-106 Seamless Steel Grade A Pipe, as set forth in Code for Pressure Piping, American Standards Association, B31.1-1942, and Supp. No. 2, B31.1-b-1947.

To meet special conditions, these fittings can be furnished in any forgeable metal including wrought iron, toncan iron, nickel, Monel, Everdur, stainless grades 304, 316, 347, etc.

For detailed engineering reference data, write for Catalog W-2.

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WeldOlets, Socket Welding —Available as standard, with outlet sizes ⅛" - 10", both straight and reducing, for use with Schedule 40 pipe. Also available in Schedules 80 and 160 up through 4" outlet size.

ThredOlets — Available as standard, with outlet sizes ⅛" - 10", both straight and reducing, for use with Schedule 40 pipe. Also available in Schedule 80 up through 2" outlet size.

Fig. 1 — Cut-away view of reducing size WeldOlet with welding outlet in place. The external rib and wide bases or footings of WeldOlets eliminate the need for extra supports to take care of bending or vibrational stresses at crotch section, the point of greatest stress.

Fig. 2 — Note blending of ear portion of welding fitting to run pipe. Extension of weld metal below inside scarfed portion of pipe insures all sections of joint greater than pipe wall thickness.

Service Co., contractor; spread office, Lindsay, Okla.; Red Dowdson, spreadman.

McCarty Oil & Gas Co.—100 miles 12-13-16-20-in., under construction, Jackson Pasture to Orange, Tex.; Anderson Brothers, contractors.

Michigan-Wisconsin Gas Co.—100 miles 10-in., under construction in Wisconsin; Anderson Brothers, contractor.

39 miles 4-3-2-in., under construction, Fort Madison to Mount Pleasant, Iowa; Rumsey Brothers Construction Co., contractor.

97 miles 22-10-in., under construction, Racine to Stoughton, Wis.; Anderson Brothers, contractor.

196 miles laterals, Milwaukee-Fond du Lac, Sheboygan, and Green Bay, Wis., under construction; C. C. Griffis Construction Co., contractor; Paul Means, superintendent for Lake Del Mort crossing.

Mississippi River Fuel Corp.—224 miles 24-in., under construction, Northwest Louisiana to Fredericktown, Mo., looping; R. B. Potashnick, contractor; field offices and spreadmen as follows: Corning, Ark., Treece Boyd; Poplar Bluff, Mo., G. L. Mims; and Fredericktown, Mo., R. L. Whitworth.

Mississippi River Fuel Corp.—10 miles 20-24-in., under contructor; Sheehan Pipe Line Construction Co., contractor; spread office, East St. Louis, Ill.; C. M. Brown, spreadman.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—340 miles 12¾-in., planned, Worland, Wyo., to Cabin Creek, Mont.

Montana-Dakota Utilities Co.—30 miles 4-in., authorized, Saco and Baker, Mont.

60 miles 3-12-in., authorized, field lines for 1948 construction.

Northeastern Gas Transmission Co.—511 miles, up to 20-in., planned, in New England area.

Northern Natural Gas Co.—41 miles 20-in., under construction, Southwest from Garden City, Kans.; R. H. Fulton & Co., contractor.

Northern Natural Gas Co.—20 miles 6 to 20-in., near Skellytown, Tex.; under way; R. H. Fulton & Co., contractor; spread office, Pampa, Tex., Jerry Nash, spreadman.

6.5 miles 6-in., near Beatrice, Neb., planned; R. H. Fulton & Co., contractor.

62 miles 20-24-in., under way, Garden City Kans., area; R. H. Fulton & Co., contractor; Ed Veach, spreadman.

58 miles 4-24-in., authorized, Hugoton and Panhandle fields; R. H. Fulton & Co., contractor; spread office and spreadmen: Garden City, F. A. Patterson; Beatrice, Neb.; Dave Wagner.

88 miles, all sizes, planned, Kansas-Nebraska looping.

270 miles 26-in., planned, additions to system north of Kansas.

Northwest Natural Gas Co.—750 miles planned; Washington, Oregon, and Idaho.

Ohio Fuel & Gas Co.—48 miles 20-in., under construction, Mount Gilead to Treat Station; Pavonia Station to Washington, C. H., Ohio; Mahoney Contracting Co., contractor.

85 miles, planned, Central Ohio replacement.

Pacific Gas & Electric Co.—47 miles 8-in., authorized, Salinas to Kilig City, Calif.

Pacific Gas & Electric Co.—506 miles 34-in., under construction, Topock, Ariz.-Milpitas, Calif.; Bechtel Corp., contractor; spread office, 1 mile north of Gilroy, Calif.; R. L. Bowman, spreadman.

Panhandle Eastern Pipe Line Co.—356 miles 26-in., authorized, looping in Texas, Oklahoma, Kansas, Missouri, Illinois, Indiana, Ohio, and Michigan.

252 miles 26-in., authorized, loops from Texas and Michigan.

Peoples Gas Light & Coke Co.—1,000 miles 30-in., planned, Houston to Joliet, Ill.

Phillips Petroleum Co.—25 miles gathering system in West Edmond, Okla., field, under construction; Vaughn & Taylor Construction Co., Inc., contractor; spread office, Edmond, Okla.

Piedmont Natural Gas Corp.—1,290 miles 20-in., planned, upper Gulf Coast area to Danville, Va.

San Diego Gas & Electric Co.—53 miles 16-in., planned, San Diego County, California.

San Diego Gas & Electric Co. (Southern Counties Gas Co.)—65 miles, authorized, San Diego-Riverside-Moreno, Calif.

Southern Counties Gas Co.—88 miles 30-in., planned, Whitewater to Rosemead, Calif.

35 miles 16-in., planned, Moreno to San Diego County, California.

South Jersey Gas Co.—77 miles, planned, Camden to Atlantic City.

Southern Natural Gas Co.—138 miles 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

375 miles 24-in., planned, Gwinville, Miss., to Atlanta.

225 miles 16-in., planned, Colfax, Ga., extension.

61 miles 24-in., under construction; Eastern Alabama loop; Latex Construction Co., contractor.

110 miles 11-in., considered; extension.

32 miles 13-in., under construction, branch line loop in Alabama; Ford, Bacon & Davis Construction Co., contractor.

314 miles 18-in., planned; extension.

171 miles 16-in., planned; extension.

118 miles 13-in., planned; extension.

Southern Union Gas Co.—78 miles 8-10-14-in., planned, New Mexico loops and laterals.

Tennessee Gas Transmission Co.—158 miles 30-in., authorized, central Louisiana to Northern Tennessee, looping.

200 miles 30-24-in., under construction, looping from Hemphill, Tex., to Monroe, La.; Morrison Construction Co., H. C. Price, contractors.

53.5 miles 30-in., under construction, Harris and San Jacinto counties, Texas; Morrison Construction Co., contractor.

65 miles 16-in., planned, Ohio-Pittsburgh spur.

700 miles 20-26-in., planned, Burnaugh.

There are many STEPS to Industrial Waste Control

Federal, State and Municipal Regulations require that you take these steps *NOW!*

A Field Survey is one of the first of these steps — to determine:

- **Exact route of contaminated flow**
- **Exact route of non-contaminated flow**
- **Quantity of surface run off**
- **Quantity of process run off**
- **Quantity of sanitary waste**
- **Quantity of infiltration**
- **Are your elevations accurate**

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Ky., to Boston, including 400-mile line to **Buffalo.**

992 miles 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

47 miles 30-in., authorized, Louisiana.

45 miles 30-in., authorized, Tennessee.

Texas-Eastern Transmission Corp.—1,400 miles planned, Texas to Pittsburgh loops.

Texas Eastern Transmission Corp.—40 miles 20-in., Lisbon to Lucky, La., under construction; Associated Pipe Line Contractors, Inc., contractor; spread office Arcadia, La.; J. A. Williamson, spreadman.

800 miles planned, New York City to New England.

69 miles 20-in., planned, looping in Beaumont, Tex., and Castor to Lisbon, La.

Texas Gas Transmission Corp.—15,000 ft. 16-in., Mississippi River crossing, 4-16-in. high-pressure gas lines near Greenville, Miss.; under construction; N. A. Saigh Co., Inc., contractor; spread office, Greenville, Miss.; Carl Doyle, superintendent.

106 miles 20-in., Carthage, Tex., to near Lisbon, La. (Sharon); under construction; N. A. Saigh Co., Inc., contractor; Carthage, Tex.; Bob Floyd, representative. Construction subcontracted: (1) Fowler Brothers, 43 miles from Carthage to Red River, field office at Carthage, M. C. Johnson, spreadman; (2) 63 miles to Sharon sta., Oklahoma Contracting Co. (J. R. Horrigan) field office at Minden, La., Ed Flanagan, spreadman.

32 miles, planned, Madisonville to Evansvile, Ind.

Texas Illinois Natural Gas Pipeline Co.—1,000 miles 30-in., planned, Houston to Joliet, Ill.

Transcontinental Gas Pipe Line Co.—605 miles 30-in., under construction, Texas to New York; Morrison Brothers Construction Co., Wunderlich & Griffis Construction Co., field office, Laurel, Miss.; G. H. Collier, spreadman; Midwestern Constructors, Inc., Williams Brothers Corp., contractors.

1,840 miles, under construction, main line 70 miles 20-in., 460 miles 26-in., 1,210 miles 30-in., Rio Grande Valley, Texas, to New York City.

35 miles, planned, New Jersey to New York-Connecticut line.

380 miles 8-16-in., planned, laterals to gas field.

216 miles 30-in., under construction. Demopolis, Ala., to Newnan, Ga.; Midwestern Construction, Inc., contractor; field office at Clanton, Ala.; M. T. Wilhite in charge; spread office, Alexander City, Ala.; A. T. Tolbert, spreadman.

Trunkline Gas Supply Co.—1,400 miles 10, 18, 20, and 24-in., planned; includes 740-mile 26-in. main line from Longville, La., to Tuscola compressor station on Panhandle Eastern Pipe Line Co., and 700 miles of gathering system.

United Fuel Gas Co.—32 miles 20-in., authorized, Roane, Calhoun, and Wetzel counties, West Virginia.

United Gas Pipe Line Co.—80 miles 2-4-6-in., under construction, laterals, North Mississippi; L. E. Farley Construction Co., contractor.

90 miles 16-in., planned, West Bay field to New Orleans.

105.6 miles 20-in., planned, loop line paralleling Carthage, Tex.-Sterlington, La., and extending on to near Monroe, La.; O. C. Whitaker Co., contractor for 40-mile spread; office and spreadman, Monroe, La., Mearle Tatum; Rosson-Richards Co., coating contractor.

26 miles in Louisiana connecting with East Texas system, planned.

United Natural Gas Co.—29 miles 12-in., authorized, laterals, Elk County, Pennsylvania.

Virginia Natural Gas Co.—153 miles planned, Buckingham to Richmond and Portsmouth, Va.

Washington Light Co.—30 miles 6-12-in., under construction, Washington, Pa.; Britton Contracting Co., contractor.

Crude-Oil Pipe Lines—Foreign

Corporacion de Fomento de Chile.—45 miles 8-in., planned, Cerro Manatiales (Springhill) to Caleta Clarencia (on Bahia Gente Grande), contracted by Tecnint Pipe Line Division, Tecnica International, S.A.

Interprovincial Pipe Line Co. (Imperial)—1,150 miles 16-20-in., planned, Edmonton area, to Superior, Wis.; contracted as follows: 450 miles 20-in., Edmonton-Regina, Canadian-Bechtel, Ltd., associated with Fred Mannix Co., Calgary, Alta.; 340 miles 16-in., Regina to Gretna, Man., Williams Brothers Corp.; 360 miles 18-in., Minnesota and Wisconsin, Anderson Brothers Corp.

Iraq Petroleum Co., Ltd.—620 miles, 16-in. Kirkuk-Haifa, Palestine, shut down.

556 miles 30-32-in., planned, Kirkuk, Iraq-Banias, Lakatia.

Kuwait Oil Co. (Gulf and Anglo-Iranian) 1,100 miles 30-in., considered, Kuwait, Arabia, to Levantine Port.

600 miles 4-30-in., under construction, Bechtel-Kuwait, Arabia.

Middle East Pipe Line Co.—800 miles 34-36-in., planned, Iran-Levantine Port, Montreal Pipe Line Co., Ltd. (See Portland Pipe Co. item in domestic crude oil list.)

Petroleos Mexicanos.—280 miles 12¾-in., authorized, Poza Rica to Salamanca, Mexico.

140 miles 10¾-in., authorized, Minatitlan to Salina Cruz.

Santos Jundial Railroad—30 miles 18-in., planned, Santos to Sao Paulo, Brazil.

Trans-Arabian Pipe Line Co.—1,067 miles 30-31-in., under construction, Abqaiq, Saudi Arabia, to Sidon, Lebanon; International Bechtel, Inc., Williams Brothers Corp., Graver Tank & Mfg. Co., and Chicago Bridge & Iron Co., contractors.

Yacimientos Petroliferos Fiscales de Argentina.—25 miles, under way, Tupungato-Lujan de Cuyo.

409 miles, under way, Plaza Huincul-Bahia Blanca.

10 miles, under way, Lujan to Cuyo-Agrelo.

CORROSION
costs more today, too!

PIPE LINES of larger diameter, together with increased pumping capacity, make any break in normal operations . . . including breaks due to corrosion . . . far more costly today. That's why it's more important than ever to give your lines the lasting protection of Koppers Bitumastic ® Enamels.

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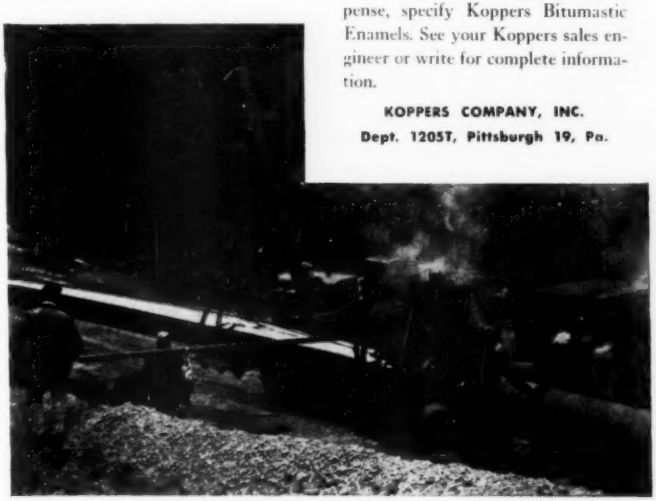

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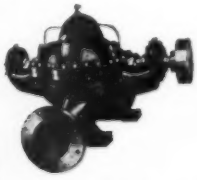

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Products Pipe Lines—Foreign

Petroleos Mexicanos.—160 miles 10¾-in., authorized, Minatitlan to Salina Cruz, Mexico.

Cia. des Pipe Lines Petroliers Francias.—150 miles 10-in., planned, Le Havre to Paris, France.

Colombian Government. — 342 miles, planned, Puerto Berrio to La Dorada, 92 miles; La Dorada to Bogota, 110 miles; La Dorada to Cartago, 140 miles.

Ministry of Petroleum of Colombia and Antioqua R.R.—107 miles, planned, Puerto Berrio to Madellin, Colombia.

Northern Pipe Line, Ltd.—300 miles 10-in., planned, Montreal to Toronto, Canada.

Santos Jundiai Railroad.—40 miles 10-in., planned, Santos to Sao Paulo to Campinas, Brazil.

Svenska Enterprenad Aktiebolget.—220 miles, planned, Uddevalla to Vasteras, Sweden.

Natural-Gas Pipe Lines—Foreign

Direccion General del Gas del Estado.—310 miles, under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

62 miles, Comodoro Rivadavia to Caleto Olivia, under way.

Northwest Natural Gas Co.—950 miles 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles 16-in., considered, Monterrey to Torreon, Mexico.

260 miles 20-in., considered, Monterrey-Tampico-Poza Rica area, Mexico.

Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas to Mexico City, D. F., Mexico.

Westcoast Transmission Co., Ltd.—1,400 miles 30-in., planned, North Alberta, Vancouver, B. C., and northern California.

Western Pipe Lines.—710 miles 22-24-in., planned, Alberta fields, Saskatoon, Alta., to Winnipeg, Man., Canada.

Alabama-Tennessee Natural To Use Aluminum Pipe

Federal Power Commission has authorized Alabama-Tennessee Natural Gas Co., Florence, Ala., to make certain modifications in a previously authorized natural-gas pipe-line project, including the substitution of aluminum-alloy pipe for steel pipe on a 9,500-ft. section of lateral line which will be used to serve the Reynolds Alloy Co. at Listerhill, Ala.

The FPC order includes authorization for Alabama-Tennessee to substitute 8⅝-in. pipe on a 35½-mile segment of the main pipe line between Muscle Shoals and Decatur, Ala., in lieu of the 6⅝-in. pipe previously authorized; to construct 2.7 miles of 10-in. and 3.8 miles of 8-in. lateral lines to serve Tennessee Valley Authority at Muscle Shoals, Ala., instead of the 6 miles of 6-in. lateral line previously authorized; and to build 10.6 miles of 4-in. and 23.1 miles of 3-in. lateral pipe lines in lieu of 29 miles of 3-in. lateral lines previously authorized to serve city-gate customers.

Estimated cost of the facilities to be modified is now $1,271,920, as compared to $1,006,900 as originally authorized. In addition, the use of the aluminum pipe instead of the steel pipe will increase the cost of that section of line by $6,300.

Two joints of 30" pipe welded together to form a length 62' long, shown in the final Bending Stage in the "Cinch" Bender. Note how the pipe was bent continuously through the Welded Joint. This demonstration established firmly, quality on an Economical Basis.

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6. Gathering Systems
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Materials and Application Procedure for

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In the natural gas and crude oil industries, gathering systems are taking on constantly increasing importance. With pipe diameters ranging from 2″ to 30″, these systems involve a large capital investment, deserving of the highest degree of care for their protection.

Barrett* Enamels and Barrett Protection Service afford an effective and economical means of extending the useful life of such gathering systems. Pre-coated pipe is easily laid and professional application is available at coating yards, pipe mills or rail heads. Modern equipment also permits economical application over the ditch.

Barrett offers an expert supervision service in connection with application plants and yards. Owners wishing to avail themselves of the advantages of professional application can have the work done with Barrett materials and under Barrett supervision. We will be glad to supply further information upon request.

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★ Leak Proof
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For ALL Lubricated Plug Valves

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P-14 — ¼"
P-38 — ⅜"
P-12 — ½"
P-34 — ¾"

C-Series →
C-14 — ¼"
C-38 — ⅜"
C-12 — ½"
C-34 — ¾"
C-100 — 1"

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COMBINATION LUBRICANT SCREW and GUN FITTING
H-14 — ¼"
H-38 — ⅜"
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REFINING

British American to Build New Refinery at Edmonton

British American Oil Co., Ltd., has chosen Edmonton, Alta., Canada, for the site of a new oil refinery which will employ more than 100 men and have an initial capacity of 2,000,000 bbl. yearly (approximately 5,500 bbl. daily).

M. S. Beringer, vice president of manufacturing for the company, reported that it has been estimated between 500 and 600 employes will be needed during the next 12 to 14-month period of construction. Tenders have been requested and contracts for construction will be awarded on a competitive basis, Beringer said. Actual construction of the plant, however, will not be started until early next spring.

Surveys are now being conducted on 500 acres of land, 4 miles east of Edmonton. From these a total of 160 acres will be selected to accommodate the refinery and enable expansion. The refinery's products will service British American outlets and agricultural accounts.

The Edmonton refinery is the latest addition to the firm's rapidly expanding Alberta holdings. Already in operation are a refinery at Calgary; an absorption plant and the first gas-recycling plant in Canada, both in Turner Valley, and the B.-A. Alberta Pipe Line, Ltd. British American wholly owns, or has a participating interest in 54 wells and has assisted in the financing of several others. The company has three seismic-survey operations in progress, holds several government reservations, and has considerable freehold acreage mineral rights. B.-A.'s total investment in the Alberta oil industry to date is in excess of $19,000,000, its annual payroll for the province alone being over $1,500,000.

New Houdriflow Plant at Drumright Nearly Finished

DRUMRIGHT, Okla.—Headway on erection of the Houdriflow plant in the Drumright refinery of Tide Water Associated Oil Co. indicates operations of the new unit will be under way before the year's end. The catalytic cracker, first major addition to the refinery in a number of years, has a nominal capacity rating of 5,000 bbl. daily. Thermal-cracking equipment at the refinery is also rated at 5,000 bbl. per day.

Crude-oil processing capacity of this Tide Water refinery is currently rated at 12,000 bbl. daily. This refinery is one of the few in the country where a natural-gas plant is located within the refinery's processing area proper. Compression equipment now employed in the gasoline plant will be converted to service on refinery gas in the new processing scheme outlined for near-future operation at Drumright. Field gas now supplied to gasoline-plant operations will be delivered elsewhere for processing.

The Houdriflow process, a recent development of Houdry Process Corp., employs bead or pelleted catalyst and operates on the moving-bed principle. Transfer of catalyst is accomplished by gas lift only. Desirable features of the Thermafor process are incorporated into the new Houdriflow unit. (Details on the operations of the cat cracker were published in *The Oil and Gas Journal, January 13, 1949, page 78.*)

Other facilities for manufacture of gasoline and gasoline-blending components in the present refinery include a modified tube and tank unit and a catalytic-polymerization plant. Gas-input capacity rating of the poly unit is 2,500,000 cu. ft. daily on design basis.

Prime contracts on installation of the Houdriflow plant at the Tide Water Drumright refinery is Process Engineers, Inc., Tulsa.

Shell to Build New Unit At Emeryville Laboratories

Plans to erect a new four-story building at Shell Development Co.'s Emeryville, Calif., laboratories were revealed by Dr. M. E. Spaght, president, last week.

Spaght pointed out that the new space is needed to carry on research plans which currently call for an expenditure, world-wide, of approximately $24,000,000 yearly.

The new building will allow for a shifting and reallocation of space within the Emeryville plant and provide additional space for both laboratory facilities and the Shell Development Co. staff. The building is part of a larger construction already under way.

Shell Development Co. started at Emeryville in 1928 with a single laboratory building and a staff of 35. With the completion of this new building, the company's research facilities cover an area of 15 acres and will house 1,200 employes. Early efforts were directed toward the development of chemicals from petro-

leum gases. Since 1933 the company's work has been expanded to include the entire field of oil refinery processes and the improvement of products.

Houston Site of Sinclair's Annual Refinery Symposium

The fourth annual refinery symposium of the technical division of Sinclair Refining Co. will be held at Houston this year, beginning December 5.

The agenda for this year's discussion covers a wide range of refining subjects and papers will be presented on specific refinery problems, with group discussions following each topic, the company reported. Among the subjects to be presented are catalytic cracking, lube-oil refining, research and development, engineering, fuels, and the safety program for the ensuing year. Since these meetings are attended by representatives of all refineries, the head of each refinery is made better acquainted with the problems at other refineries and a more intimate knowledge of operations at all refineries is gained, Sinclair said. Each year a different refinery is selected as headquarters for the meeting. Any problems remaining unanswered at the conclusion of the meetings are referred to specific departments within the company for further development and subsequent discussions.

T. B. Kimball of the New York office will act as chairman and will also lead the discussion on light-oil operations. T. D. Tifft will speak on maintenance problems and E. D. Hill on lubricating-oil problems.

Graco Oil & Refining Co. Now Known as Sioux Oil Co.

Stockholders of Graco Oil & Refining Co., Denver, have changed the corporate name of the organization to Sioux Oil Co.

The firm is now installing a cracking unit at the Newcastle, Wyo., refinery and supplies of crude oil will come from the nearby Mush Creek and Fiddler Creek oil fields.

Sioux's other refinery is located at Chadron, Neb. Combined crude-oil run at the two plants will be approximately 3,000 bbl. per day when current improvements are completed.

Indiana Standard Develops New Winter-Grade Gasoline

Development of an improved premium-grade winter gasoline giving "1-second" starting plus "19 per cent faster warmup than premium gasolines in general use last winter" has been announced by Standard Oil Co. (Ind.).

The new gasoline also cuts engine sputtering and stalling, reduces battery drain and fuel consumption, and gives all the knock-free power the engine can deliver.

"In addition to meeting the popular demand for a high antiknock gasoline for modern cars, the new product has been so improved in volatility as to insure the best possible starting and warm-up performance for all types of motor vehicles," according to the company.

New Lube Oils Offered

Standard Oil Co. of California has developed a new series of diesel and heavy-duty gasoline-engine lubricants, which the company claims have the most important improvement in performance and quality since 1935, when California Standard brought out the first compounded diesel lubes. The new Delco lube-oil line has been developed after 3 years of research and an expenditure of about $3,000,000 to meet tougher postwar conditions.

Chemical Plant Sets Record

Phillips Chemical Co.'s Cactus plant, near Etter, Tex., passed its millionth man-hour without a lost-time accident at 12 noon, November 18, according to an announcement by K. S. Adams, president of Phillips Petroleum Co. and its wholly owned chemical subsidiary. The record was established over a period of 391 calendar days, the last lost-time accident having occurred on October 22, 1948. Cactus Plant produces anhydrous ammonia from natural gas.

Ethyl Awards Fellowships

Ethyl Corp. has awarded eight university fellowships to eight American colleges. Seven are graduate fellowships and the other is for postdoctorate research work. Fellowships are sponsored in fields of interest to the petroleum, automotive, and chemical industries, and carry an aggregate value of $12,000. The firm began awarding fellowships in 1937.

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AU-206

Among the

Drilling Contractors

Midland Contractor Finds New Field in West Texas

Hall & Stewart Drilling Co., Midland, Tex., is the contractor on a prospective new discovery well in southern Midland County, West Texas. The well, 1 Peck, being drilled for General American Oil Co. of Dallas, flowed at the rate of 20 to 25 bbl. of oil per hour during a drill-stem test of a Pennsylvanian zone at 10,344-369 ft. At latest report, the hole was being cored ahead. Original contract was for a 10,500-ft. test. The location, in 21-41-4s-T & P Survey, is 30 miles southwest of Midland near the Upton County line in an area about 4½ miles west of the Pegasus Ellenburger field.

New Contracting Firm

Sam G. Walker, formerly associated with Burr Lambert for many years, has formed a company of his own to operate and do contract drilling in the Illinois, Indiana, and western Kentucky area. The new company, Walker Drilling Co., has headquarters at Evansville, Ind.

Newton Barrett Drilling Co. has started a 5,600-ft. Wilcox sand test for Gulf Coast Western Oil Co. at 1 Rose, 4-10n-4e, east of Shawnee, Pottawatomie County, Oklahoma. The location is on the east flank of the abandoned Shawnee pool.

Commonwealth Drilling Co., Calgary, is moving in for a wildcat test to be drilled for Alberta Exploration Syndicate in the Birch Lake area, near Ranfurly, 73 miles southeast of Edmonton, in East Central Alberta Province, Canada.

Edwards Drilling Co., Wichita, is drilling for Aladdin Petroleum Co. at 1 Schutter, a new extension test being started a half mile east of the Davis Ranch pool, in 34-13-10e, Wabaunsee County, northeastern Kansas.

Big Chief Drilling Co., Oklahoma City, has contracted with The Texas Co. for a well to be drilled as the northwest offset to the discovery well recently completed by Continental Oil Co. in the Tennessee Colony area in Anderson County, East Texas. Location is on the Avant land in the A. G. Monroe Survey, Manuel Rionda Grant.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 11-21-49	Change week ended 11-14-49	Change week ended 11-22-48
Gulf Coast	534	+18	—105
W. Tex.-N. Mex.	679	+20	+ 77
Ark.-N. La.-E. Tex.	162	— 6	— 26
Oklahoma	257	+10	— 47
Kansas	125	0	— 2
Illinois-Eastern	141	+ 1	— 12
Rocky Mountains	112	+ 1	— 49
Pacific Coast	144	—23	— 63
Total United States	2,154	+21	—227
Western Canada	85	+ 2	+ 9
Total	2,239	+23	—218

*Courtesy Hughes Tool Co.

Peel Drilling Co., Hoisington, Kans., is starting three new contracts for Derby Oil Co., one in Stafford County, another in Barton County, and the third in Graham County, Kansas. The first is for 1 Gunn, 1-21-13, a mile east of the Prairie Home pool at the northern edge of the county; the second for 1 Blathazor, in 13-9-21, in the extreme eastern part of the county; and the third for 1 Churchill, 33-20-12, a mile west of the Bryant pool, in the extreme southern part of the county.

George Puckett, Wewoka, Okla., contracting for Otha H. Grimes, has started the second well for the new Northwest Scipio pool in Pittsburgh County, Oklahoma. The new well, 1 Sarkeys, in 14-7n-12e, is about a mile east of the Grimes discovery well, completed as a 15,000,000-cu. ft. gasser from Cromwell sand around 4,200 ft.

Nolan Drilling Co., Casper, has moved a rig into the Lake Creek area, Hot Springs County, Wyoming, where it will drill for Barnsdall Oil Co. and Sohio Petroleum Co. at 1-B Harrison, 14-43n-92w.

Gragg Drilling Co., Palestine, Tex., has operations under way at The Texas Co. 1 Prasifka, a Woodbine exploratory test in the A. H. Heatley Survey, 2 miles northeast of Keechi, northern Leon County, East Texas. Woodbine is expected around 5,600 ft.

Coats & Hearrell, Longview, Tex., have rigs running at two new tests in Wood County, East Texas. One is on a wildcat being drilled for F. R. Jackson at 1 Barrison Estate in the L. W. Gilliam Survey, 5 miles southeast of Winsboro. The other is one Deupree & Jackson 2 J. A. Durrett, second test for recently opened Pine Mills field.

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The latter is 1,000 ft. southwest of the discovery well, which these contractors also drilled.

Deardorf Oil Co., Oklahoma City, is the contractor for Earl Sadler on a well being started at 1 Longaker, 5-9n-5e, ½ mile northwest of production in the Earlsboro pool, eastern Pottawatomie County, Oklahoma.

John Halko, Shawnee, Okla., is moving in a rig to drill a projected 4,950-ft. test for B. B. Blair at 1 McKosato, 13-11n-5e, in northern Pottawatomie County. The location is 4 miles southwest of the Prague pool, in southern Lincoln County.

Dyer Drilling Co., Denver, has the contract for a well to be drilled for Bill Tomberlin in the Big Sandy area, Washakie County, Wyoming. Location is for 1 Government, in 5-45n-90w.

Dick Wegener, Oklahoma City, has a 7,500-ft. contract for a wildcat test being started for L. C. Tharpe at 1 Ferrell, in 21-1s-7w, 3½ miles south and a little east of Duncan, Stephens County, Oklahoma.

Noble Drilling Co., Tulsa, has been awarded a contract by Texas Pacific Coal & Oil Co. for a deep wildcat test to be drilled 9 miles southeast of Roundup, in southern Musselshell County, Montana. The test, located in 11-7n-27e, in the Bull Mountain basin, is projected to 10,000 ft. A rig capable of drilling to depths below 15,000 ft. will be used.

Fred M. Manning, Inc., Denver, is starting a 5,300-ft. Muddy sand test for William Hamm, Jr., in the West Stoner area, Campbell County, Wyoming. Location is on Government land, in 27-55n-69w.

Woods Drilling Co., New Orleans, has completed another good well for its own account in the East Lindsay field, Garvin County, Oklahoma. The well, 1 Mitchell, flowed at the rate of 565 bbl. per day from the second Bromide pay at 10,225-290 ft. with bottom of the hole at 10,401 ft.

Randall Drilling Co. has been awarded contract for a projected 6,800-ft. wildcat test to be drilled for J. D. Reese and associates in the area about 3 miles southwest of the Ellisle field and about 2 miles west of the Dolorose townsite, Wilkinson County, Mississippi. The test is 1 Breaux et al, in 31-4n-3w.

Altus Drilling Co., Oklahoma City, which recently completed a good producer for Russell Maquire at 1 Rowlan on the southwest edge of the Jones pool in Oklahoma County, Oklahoma, has started another test for the same operator at a location south of the first well. Pay zone is the Cleveland sand at approximately 4,900 ft.

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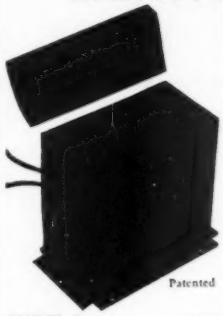

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NATURAL GAS

Southern Counties' Rate Schedule Put Into Effect

An interim rate schedule filed by Southern Counties Gas Co. of California was permitted in effect on November 20 by Federal Power Commission so the company could proceed with deliveries and sales of natural gas to San Diego Gas & Electric Co. through a new pipe line authorized in a recent commission order.

The interim schedule will continue in effect until FPC issues its final decision in the proceeding initiated by FPC October 31 when it rejected a proposed tariff filed by the company covering its natural-gas sales to the San Diego firm. Hearings in that proceeding were held in November, and were recessed until next March.

Report Issued on Hydrogen Sulfide Detection Method

U. S. Bureau of Mines has issued a report on determination of low concentrations of hydrogen sulfide in gas by the methylene blue method.

An ultrasensitive method for rapidly detecting the presence of small quantities of hydrogen sulfide in gas is being used successfully in research at the bureau's synthesis gas-production laboratory at Morgantown, W. Va.

Using methylene blue as the indicator, the process detects concentrations of as little as .001 of a grain of hydrogen sulfide in 100 cu. ft. of gas using a cubic-foot sample and duplicates the results with a high degree of identical samples, the bureau report discloses.

Natural Gasoline

Work Is Progressing on New Cities Service Installation

Construction is progressing rapidly at Cities Service Oil Co.'s new Chico natural-gasoline plant 45 miles northwest of Fort Worth. Company engineers expect the plant to be completed by Christmas, as all buildings are finished.

The Chico unit, Wise County's only natural-gasoline plant, marks a step toward conservation of natural gas in this field. Cities Service provided the county with its first commercial oil production.

The plant is so designed that, with installation of additional equipment, ultimate capacity of 22,500,000 cu. ft. of gas can be processed daily.

Pipe-line contractor for the high and low-pressure field-gathering system has moved in and it is estimated the job will be completed within 30 days.

7 Per Cent Increase Shown For L.P. Products by Bureau

Natural - gasoline and allied products demand at plants including receipts from outside sources totaled 4,851,175,000 gal. in the first 9 months of 1949, according to a report issued by U. S. Bureau of Mines. This is an increase of 7.1 per cent over the same period during 1948.

The highest daily production period this year (from January to September) was in September, which totaled 18,563,300 gal. This compares with 18,105,000 gal. in February and 17,595,000 gal. in January.

While daily average production at natural-gasoline and cycling plants increased 7 per cent in the first three quarters, crude-oil production decreased approximately 8 per cent. The light-products increase was due primarily to new capacity going on stream.

Liquefied - petroleum gas used for fuel amounted to 1,116,618,000 gal., an increase of 6.9 per cent from the first 9 months of 1948. Shipments to jobbers and trade outlets in the first 9 months, compared with the same period a year ago, was as follows: natural gasoline, 135,469,000 gal. and 132,657,000 gal.; condensate, 7,329,000 gal. and 4,308,000 gal.; finished gasoline and naphtha, 351,885,000 gal. and 265,297,000 gal.

Shipments to refineries in the same manner, were: natural gasoline, 1,776,312,000 gal. and 1,731,790,000 gal.; natural-gasoline mixture, 247,604,000 gal. and 268,217,000 gal.; condensate, 262,173,000 gal. and 260,058,000 gal.; normal butane, 171,282,000 gal. and 84,470,000 gal.; isobutane, 113,939,000 gal. and 150,691,000 gal.; isopentane, 37,358,000 gal. and 40,376,000 gal.; other L.P.G., 54,671,000 gal. and 58,024,000 gal.; and finished gasoline and naphtha, 105,846,000 gal. and 108,685,000 gal.

Daily average production of all light products for the 9-month period was as follows: January, 17,595,000 gal.; February, 18,105,000 gal.; March, 17,305,000 gal.; April, 17,268,000 gal.; May, 16,888,000 gal.; June, 16,735,000 gal.; July, 16,892,000 gal.; August, 17,672,000 gal.; September, 18,563,000 gal.

Daily average production from January to September this year was 17,439,000 gal. compared with 16,300,000 gal. a year ago.

Levelland Gasoline Plant Is Now in Operation

Operations at the new Levelland natural-gasoline plant in West Texas began early this month, and the entire field-gathering system was cut in last week. Gas is being compressed, sweetened, and dehydrated at the plant and residue is sold to a pipeline company.

Stanolind Oil & Gas Co., operator of the unit, began taking casing-head gas from the Levelland field on November 8. Unstabilized condensate is being shipped to the Slaughter gasoline plant, which is 15 miles from the Levelland plant, to be rerun and stabilized.

Final completion of the absorption, distillation, and fractionation sections at Levelland is scheduled for February 1, 1950. When completed it will have a daily capacity of 40,000,000 cu. ft. of gas and a maximum liquid-products output of more than 130,000 gal. daily.

Other owners of the installation include The Texas Co., Magnolia Petroleum Co., Mid-Continent Petroleum Corp., Tide Water Associated Oil Co., Superior Oil Co., Skelly Oil Co., Maracaibo Oil Exploration Corp., Cobb & Watson, and Ralph Lowe.

Two Texas University Men Using N.G.A.A. Fellowships

Two University of Texas graduate researchers in chemistry are using Natural Gasoline Association of America fellowships to fight corrosion in oil-producing equipment.

Edward N. Wheeler, Ingleside, Tex., has a grant to isolate and study oxygenated compounds produced by high-pressure wells, and E. E. Glenn, Shreveport, is seeking the mechanism of metal corrosion in high-pressure wells and the relation between such reactions and the oxygenated compounds.

Chicago Meeting Launches National L.P.G. Promotion

A recent meeting in Chicago, sponsored by Liquefied Petroleum Gas Association, Gas Appliance Manufacturers Association, and Natural Gasoline Association of America, launched a national promotion to consolidate the L. P. G. industry's gains of recent years and further expand its markets.

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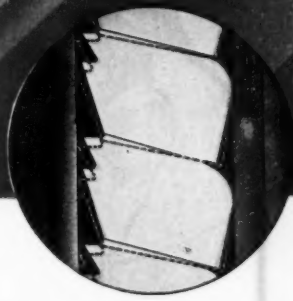

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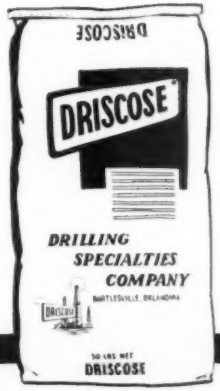

DRILLING SPECIALTIES COMPANY

BARTLESVILLE, OKLAHOMA

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Exploration and Drilling

Midland Black Shale Basin of West Texas

THE Midland black shale basin of West Texas, particularly in the Upton - Midland county area, just won't let the reef play in the eastern shelf area of Scurry-Mitchell-Borden-Howard counties monopolize the limelight of exploration interest.

General American Oil Co. of Texas 1 Peck, NW NW Section 21, Block 41, T4S, T&P Ry. Survey, 4½ miles west and 1 mile north of the Pegasus field discovery well, along the Midland-Upton county border, looks like a strike in the Pennsylvanian.

On a 3½-hour drill-stem test at total depth of 10,369 ft., with packer at 10,114 ft., with a ⅝-in. bottom choke, and using 1,100-ft. water blanket, gas showed in 17 minutes, water cushion flowed in 1 hour and 50 minutes, and oil in 2 hours and 3 minutes. It flowed by heads, and was estimated to be making 20 to 25 bbl. of oil per hour. Recovery was 2,300 ft. of free oil, 2,300 ft. of heavily oil-and-gas-cut water and mud, with flowing pressure varying from 1,000 to 1,500 psi. No bottom-hole buildup pressure was obtained because of mechanical trouble. The well is now being deepened, late reports showing 10,402 ft. total depth. The company says it plans to penetrate the formation before making further tests.

This well first attracted attention when it topped the Wolfcamp in the base of the Permian, only 88 ft. low to the discovery well at Pegasus. *(See The Oil and Gas Journal, November 10, 1949, page 397).* When it went out of Wolfcamp, and into the Pennsylvanian, reportedly only 80 ft. low to the Pegasus discovery, interest was even greater. It is "hot" now, but not nearly as hot as it would be had not Phillips Petroleum Co. 1-BB TXL, in Section 25, Block 41, T4S, T. & P. Ry. Survey, a one-location northwest outpost to the Pegasus discovery, reported topping the Devonian 480 ft. low. That raises some puzzling questions about Pegasus. Is there faulting: or is it a very steep dip structure, that is going to cut off sharply on the west or north?

The right answer to these questions is hard to figure right now. Yet it may well be decided whether the Peck strike is a new field, or a very long extension to a very big Pegasus field. To the south there are also questions, the answer to which is not too clear at present. Republic Natural Gas et al 1 American Republics Corp. fee, NW NW Section 6, Block 40, T5S, T&P Ry. Survey, about 1⅜ miles southwest of the farthest southeast producer in Pegasus field, after first being reported running 100 ft. high on the Pennsylvanian compared to the nearest producer, was later reported checking 80 ft. low on the Devonian to the same well.

Then the question of finding another field in the gap between Benedum and the Pegasus fields may find an answer as far as Ellenburger is concerned before too long. *(See The Oil and Gas Journal, October 6, 1949, page 361).* Humble Oil & Refining Co. 1 Oswalt, Section 12, CCSD&-RGNG Survey, 4 miles northwest of Benedum field, had an encouraging show a while back in the Fusselman section of the Silurian. On drill-stem test at 11,505-94 ft., gas showed at surface in 14 minutes, water blanket started flowing in 18 minutes, and total recovery was 260 ft. of oil and gas-cut water blanket, 90 ft. of oil and gas-cut drilling mud, and 702 ft. of 54°-gravity distillate. Open - hole flowing bottom-hole pressure was 900 psi., shut-in pressure after 30-minute buildup was 2,514 psi. This well should soon be getting some answers in the Ellenburger.

About 12 miles north and east of Pegasus, York & Harper, Inc., 1-A Gulf TXL, Section 25, Block 39, T3S, T&P Ry. Survey, topped Fusselman Silurian at 12,625 ft., and ran 2½-hour drill-stem test at 12,573-12,685 ft., and recovered 990 ft. of gas-cut mud, 850 ft. of free oil, and 3,240 ft. of oil and mud-cut water blanket, the oil content of which was estimated at 1,800 ft. This is on a Gulf Oil Corp. farmout, about 1½ miles northwest of Gulf 1-E Bryant, which also had shows in the Fusselman, but failed to produce in Ellenburger.

Charles J. Deegan.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MISSISSIPPI.—Two wildcats, both looking for pay in the Smackover lime, are attracting attention in the delta section of the state. Sun Oil Co. and C. H. Murphy are below 7,200 ft. in the 1 Lee in Washington County, and the S. C. Oil Group 1 Joe Lazarov in Issaquena County is below 8,100 ft.

ROCKY MOUNTAIN AREA.—Ohio Oil Co. recovered oil from the third Dakota, indicating a new pay zone, in its extension to Gurley pool, Cheyenne County, Nebraska. Water was found in the Nugget by Pure Oil Co. at its West Douglas Creek, Colorado, wildcat. Steelco Drilling Co. found staining in the Dakota at its Glenrock, Wyoming, wildcat and is now making drill-stem test of that formation.

WEST TEXAS.—Possible new Simpson production was in prospect at La Gloria Corp.'s core hole test on the L. L. Cresse tract, 2½ miles northwest of Girvin in northern Pecos County. It cored a saturated section at 4,783-88 ft., and a drill-stem test recovered 2,700 ft. of oil. The well was to be drilled to the Ellenburger before making further tests. General American 1 Peck, Midland County Pennsylvanian prospect, was drilling ahead at 10,448 ft. at last report, about 104 ft. into the formation, with an estimated net pay section of 70 ft. Rambo & Stephens and T. W. Murray 1 Stephens, Section 81, 1½ miles west of North Winters field in Runnels County, flowed 60 bbl. of oil through ½-in. choke in ½ hour, from perforations at 4,512-16 ft. The well kicked off after running the swab four trips.

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OKLAHOMA

Deeper Pay Zone Discovered In Southwest Goldsby Pool

DEEPENED from the Bromide, in which it had been completed as the discovery well of the Southwest Goldsby pool, McClain County, Danciger Oil & Refining Co. 1 DeCordova, NW SE SW 35-8n-3w, has found production in the Tulip Creek sand to open a second pay zone for the area.

Hole was deepened from a previous total depth of 9,383 ft. to 10,292 ft., logging the Tulip Creek at 9,715-98 ft., the McLish at 9,853-9,902 ft., first Oil Creek at 9,943-73 ft., second Oil Creek at 9,983-10,048 ft., and Joines sand at 10,203-87 ft.

Casing was run to near bottom, and with plug drilled out to 10,242 ft., was perforated in Tulip Creek at 9,719-24 ft. On a production drill-stem test with 5/8-in. choke on bottom and 1/2-in. choke on top the well flowed 12.4 bbl. of 40° oil per hour for 19 hours. Tubing pressure was 375 psi., and indicated gas-oil ratio 498 cu. ft. per barrel.

Unofficial reports indicate that Alpha Petroleum Corp. may be opening a new Misener sand pool in its 1 Hargrove, NE SE NE 1-16n-1w, 2½ miles south of Langston, Logan County. The well has been drilled as a "tight" hole and the operating company has not released full information, but other reports give a total depth of 5,085 ft. with approximately 14 ft. of sand from 5,071 ft., on which casing has been run. A drill-stem was made in the sand, showing, according to the reports, gas in 3 minutes and an oil flow within 18 minutes. The prospective well is 2 miles west of production in the Northwest Iconium pool and is just south of the abandoned South Langston pool, which had production in the Simpson dolomite.

T. H. McCasland 1 McClure, SE SW SE 15-5s-1e, prospective new pool opener 5 miles southwest of Ardmore, Carter County, has improved its production substantially in a renewal of testing following a 60-qt. shot. Retesting in Tulip Creek sand at 3,846-70 ft., it flowed 82 bbl. of oil and 3,500,000 cu. ft. of gas through casing on a 24-hour gage. In earlier tests 'ts production was at the rate of 25 bbl. of oil and 2,500,000 cu. ft. of gas daily. The area is 2 miles east of the Brock pool and about the same distance west of the Ardmore pool.

OKLAHOMA SUCCESSFUL WILDCATS

Carter County: New pay and extension in Hewitt field—Blaylock 1 Dillard, SW NW SW 27-4s-2w, pumped 18 bbl. of 32°-gravity oil per day from open hole in Dillard sand (Pennsylvanian) at 3,102-17 ft., TD 6,230 ft.

Okfuskee County: New pay in Southeast Blakely field—Mid-Continent 8 Weehunt, SW SE SE 6-11n-11e, flowed 50 bbl. of 39°-gravity oil per day from Gilcrease at 2,837-41 ft., TD 2,842 ft.

OKLAHOMA WILDCAT FAILURES

Beckham County: Devine et al 1 Watson, SW NE NE 34-9n-25w, dry, TD 3,929 ft.

Bryan County: Lewis 1 Callahan, SE NE SW 34-6s-9e, dry, TD 3,346 ft., Viola 1,356 ft., Simpson 2,022 ft.

Cotton County: Nagle 1 Emery, SW SW NW 26-4s-13w, dry, TD 1,757 ft., sand 1,025 ft. and 1,331 ft., coal 1,414 ft., hard sand 1,434 ft., soft sand 1,497 ft. and 1,533 ft., sand 1,583 ft., coal 1,684 ft.

Lynch 1 Jordan, NW NE SE 14-5s-13w, dry, TD 1,890 ft., sand 1,369 ft., 1,484 ft., 1,598 ft., 1,702 ft., and 1,868 ft., all water.

Greer County: Swarthout 1 Sullivan, NE NE SE 26-5n-21w, dry, TD 611 ft., in granite.

Logan County: Manahan Oil Co. 1 Burton, NE SE SE 25-17n-1e, dry, TD 5,120 ft., Skinner 4,396 ft., lower Skinner 4,478 ft., lime 4,508 ft., brown lime 4,588 ft., Mississippi lime 4,632 ft., Woodford 4,654 ft., Hunton 4,688 ft., Sylvan 4,802 ft., Viola 4,888 ft., dense 4,928 ft., dolomite 4,952 ft., Wilcox 4,978 ft., second Wilcox 5,111 ft.

Duncan 1 Shircliff, SW NW SW 17-18n-3w, dry, TD 6,389 ft., Oswego 5,277 ft., Mississippi lime 5,643 ft., Woodford 5,965 ft., Misener 6,031 ft., Hunton 6,052 ft., Sylvan 6,073 ft., Viola 6,174 ft., dolomite 6,254 ft., Wilcox 6,286 ft., Marshall 6,303 ft., second Wilcox 6,384 ft.

Marshall County: Miller Bros. 1 Winooski Savings Bank, SW SE NE 18-6s-7e, dry, TD ? ft., strat test, no information released, deepest depth reported 1,100 ft.

Pottawatomie County: Sherrod & Apperson 1 Fidler, NE NE NW 4-5n-5e, dry, TD 2,906 ft.

Sequoyah County: Loman & Johnson 2 Cook, C SW NE 8-12n-24e, dry, TD 1,770 ft., Mississippi lime 495 ft., Boone lime 640 ft., Kinderhook 660 ft., Woodford 675 ft., cherty sandy lime 709 ft., Hunton 755 ft., Sylvan 964 ft., Fernvale Viola 994 ft., Trenton 1,010 ft., Simpson 1,047 ft., Arbuckle dolomite 1,390 ft.

Woodward County: Zavoico et al 1 Vickery, C SE NW 36-23n-17w, dry, TD 9,255 ft., Layton 5,620 ft., sand 5,660 ft., conglomerate sand 6,110 ft., Chester 6,890 ft., Mississippi lime 7,650 ft., Woodford 8,510 ft., Bois d'Arc-Hunton 8,555 ft., Chimney Hill 8,820 ft., Sylvan 8,875 ft., Viola 8,965 ft., Wilcox 9,180 ft., second Wilcox 9,210 ft.

MICHIGAN

Tuscola County Well Tests Gas, Drills On

MOUNT PLEASANT.—An estimated 500,000 cu. ft. of Traverse gas was logged on Fletcher-Leman 1 Livingston, SE NW SE 21-14n-10e, Elmwood Township, Tuscola County, at 1,924 ft. Top of the zone was logged at 1,873 ft. and drilling was resumed to the Dundee objective. The 1 Livingston developmental test is the first start in the Elmwood district since the completion of O. H. O'Neal's 1 Winchester, discovery in the Dundee. The current well is located about ½ mile southeast of the Winchester producer and is in the approximate center of the drilling block originally assembled for this play.

Although it was not the first dry hole to be drilled in Bard field, W. L. McClanahan and W. B. Stewart A-2 Dull, NW SE NE 6-17n-2w, Beaverton Township, Gladwin County, was probably the most important failure scored in the area to date. This test, direct 10-acre south offset to the best producer in the pool, and reported to be about 2 ft. higher structurally than the north offset, was bottomed out dry in the Dundee objective at 3,945 ft., where 500 ft. of salt water was showing after well was shut in over night. Dundee lime top was picked at 3,870 ft. The A-2 Dull appeared to establish "a lack of porosity" barrier to further expansion of the pool to the southeast. Last week same operators completed the A-1 Dull, SW NE NE 6-17n-2w, good for 223 bbl. a day, restricted flow, after a 2-stage acidization with 1,000 gal. and 1,500 gal. It was the best completion in the pool on the basis of initial production.

With the approval of 21 new drilling permits by the Department of Conservation during the week ended November 18, total permits issued this year was 916, just 2 short of last year's final total number. Up to November 19, 1948, the state had approved 838 permits. Ten of the 21 new wells approved were for wildcats.

MICHIGAN WILDCAT FAILURES

Gratiot County, Arcada Township: Columbia Oil & Gas Co. and Chapman Oil Co. 1 McConnell, SE SE NW 30-11n-3w, Dundee 3,227 ft., dry, TD 3,278 ft.

Mason County, Eden Township: J. A. Straker 1 Major, NW SW NW 31-17n-16w, Dundee 2,253 ft., dry, TD 2,376 ft.

Saginaw County, Richland Township: Wallhalla Oil Co. 1 Pretzer, NW SE SW 11-12n-2e, Dundee 3,297 ft., dry, TD 3,423 ft.

Van Buren County, South Haven Township: Louis Zellman 1 Sherman, SW NE NW 1-1s-17w, Traverse 1,049 ft., dry, TD 1,051 ft.

KANSAS

Three New Pools Opening In North Hammer Vicinity

THE area around the North Hammer pool in southeastern Barton County, about 8 miles east of Great Bend, continues in the spotlight with three new productive spots being established within a radius of 2 miles.

Two miles north of the pool, Aladdin Petroleum Corp. and associates have placed their 1 Kultgen, SW SW NW 12-19-12, on the pump following swabbing tests in which it showed for about 3 bbl. of oil per hour, and now are taking potential tests. Production is from the Arbuckle lime, topped at 3,387 ft. (—1,565 ft.), with open hole at 3,390-3,412 ft.

About midway between this well and the pool, the same operators are completing their 1 Schartz, SE SE NW 14-19-12, as a Lansing well. Swabbing tests indicated a production of about 15 bbl. per hour. Pumping equipment is being installed. Casing, which was run to 3,422 ft. to test the Arbuckle at 3,427-33 ft., is perforated at 3,141-55 ft. and 3,165-74 ft., with top of the Lansing at 3,143 ft. (—1,290 ft.). Tests in the Arbuckle showed water, and plug was set at 3,385 ft.

Southeast of the pool about 1½ miles and about 1 mile north of the Silica pool, in the SE NE SE 25-19-12, W. L. Hartman is testing the Lansing in his 1 Hammeke but with somewhat questionable results. There was 40 ft. of oil and 1,340 ft. of water in the hole after casing had been perforated in six intervals from 3,098 ft. to 3,271 ft. Top of the Lansing had been checked at 3,100 ft. (—1,304 ft.). The well also had showings in the Arbuckle, topped at 3,339 ft. (—1,563 ft.), but tests with casing at 3,362 ft. and hole carried to 3,388 ft. proved unsuccessful.

The North Hammer pool, discovered last March by Aladdin Petroleum Corp. and Hannum Drilling Co., produces from both the Lansing and Arbuckle with 18 wells having been completed.

In southwestern Morris County, Mouser Drilling Co. is testing showings encountered in the Mississippi chat in its 1 Peterson, SW SW NE 27-17-5e, a wildcat about 2 miles south of the Burdick pool and about 5 miles east of the Lost Springs pool, in Marion County.

KANSAS SUCCESSFUL WILDCAT

Sumner County: Champlin Refining Co. 1 Slentz, NW NW NW 10-35s-2w, pumped 50 bbl. of 47.5°-gravity oil per day from Simpson sand at 4,711-19 ft.; Tonkawa 3,060 ft., Layton (?) 3,453 ft., Mississippian 4,256 ft., Viola 4,707 ft., TD 4,719 ft.

KANSAS WILDCAT FAILURES

Barton County: Phillips & Hansen 1 Koch, SE SE NE 25-19s-14w, dry, TD 3,528 ft., anhydrite 620 ft., Kansas City 3,198 ft., conglomerate 3,427 ft., Arbuckle 3,470 ft.

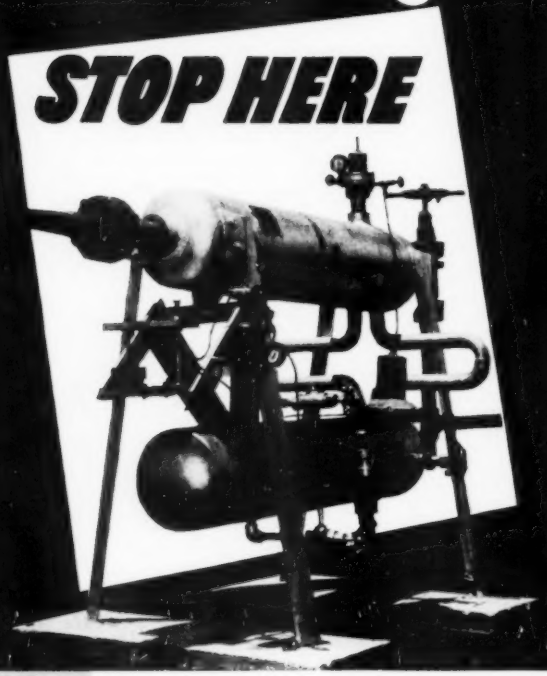
Ellis County: Appleman & Peel 1 Baldwin, SW SW SW 13-11s-20w, dry, TD 3,710 ft., Hoxbar 3,242 ft., Lansing 3,281 ft., basal Kansas City 3,544 ft., conglomerate 3,571 ft., Arbuckle 3,661 ft.

Greenwood County: Thompson & Hurdick 1 Curry, C E/2 E/2 NE 6-22s-11e, dry, TD 2,118 ft., Bartlesville 1,838 ft., Mississippian 2,018 ft.

Lyon County: Mendenhall Drilling Co. et al 1 Neil, NE NW NE 9-21s-12e, dry, TD 2,578 ft., Kansas City 1,282 ft., basal Kansas City 1,386 ft., Mississippian 2,010 ft., Kinderhook 2,389 ft., Viola 2,476 ft., Simpson sand 2,510 ft., Arbuckle 2,564 ft.

Rooks County: Birmingham & Bartlett 1 Kern, NW NW NE 15-9s-20w, dry, TD

Your Gas Line Freezing Troubles



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PARKERSBURG

3,706 ft., anhydrite 1,655 ft., Hoxbar 3,358 ft., Lansing 3,397 ft., conglomerate 3,659 ft., Arbuckle 3,666 ft.

Russell County: Jones-Shelburne & Farmer 1 Mellard, NE SE NE 12-12s-15w, dry, TD 3,171 ft., anhydrite 710 ft., Topeka 2,502 ft., Hoxbar 2,755 ft., Dodge 2,775 ft., Lansing 2,806 ft., Arbuckle 3,136 ft.

Prairie Oil Well Drilling Co. 1 McCormick, SW SW SE 35-12s-14w, dry, TD 3,072 ft., anhydrite 603 ft., Tarkio 2,230 ft., Topeka 2,425 ft., Kansas City 2,753 ft., conglomerate 3,045 ft.

Sedgwick County: Stienbuchel & Mannebach, C W/2 SW SE 9-26s-2w, dry, TD 3,950 ft., Lansing 2,600 ft., Kansas City 2,835 ft., Mississippian 3,460 ft., Kinderhook 3,806 ft., Viola 3,934 ft., Simpson sand 3,949 ft.

Ecklund Drilling Co. and Turpin 1 Romeback, SW SE SE 6-29s-1w, dry, TD 3,566 ft., Kansas City 2,895 ft., basal Kansas City 3,099 ft., Mississippi lime 3,515 ft.

SOUTH LOUISIANA

Magnolia to Squeeze Off And Test Higher at B-1 Well

NEW ORLEANS.—In the Eugene Island area of Terrebonne Parish, Magnolia Petroleum Co. has made a drill-stem test on the B-1 State Lease 673. Five-inch liner was run to bottom at 13,440 ft. and operators perforated the interval from 11,204-08 ft. The well developed a flowing pressure of 2,700 psi. on the tubing and had a bottom-hole flowing pressure of 6,590 psi. The test indicated no shows of oil or gas and operators plan to squeeze off and test higher.

Placid Oil Co. and The Texas Co. are preparing to abandon the 1 State of Louisiana and L. L. & E. Co. Unit 2, 44-19s-27e, Plaquemines Parish wildcat, which was drilled to a depth of 13,005 ft. The well was perforated at 12,628-82 ft. with 324 shots and slight blow was received for 7 hours, although no commercial shows were encountered.

Another promising wildcat which was abandoned is Shell Oil Co. 1 State Lease 1280, 13-13s-18e, which was drilled to 12,319 ft. in shale and found dry.

In Acadia Parish, Hassie Hunt Trust has spudded the 1 H. L. Keane, ½ mile north of the 1 S. W. Robison, and is now drilling ahead after cementing 16-in. conductor pipe. Test locates approximately ¼ mile southeast of Maxie in the northeast corner of Section 31-8s-1e. Operators are still trying to bring in the Robison where drill pipe has been stuck for the past several weeks.

Operators have finally managed to sidetrack past stuck pipe in Gulf Refining Co. 1 Provost-Cyr Unit in the Weeks Island area, Iberia Parish, and are now drilling below 12,700 ft. Test is in the northeast corner of Section 19-14s-7e, approximately 1¼ miles southeast of Shell's deep production on the northeast flank and approximately 1¾ miles northeast of Humble's production on the southeast flank.

The 16 new locations in South Louisiana include 4 wildcat starts, 1 each in Acadia, Orleans, Therrebonne, and West Feliciana parishes. There were two successful exploratory tests completed during the week, one each in Jefferson and Rapides parishes.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Jefferson Parish: New pay at Avondale—Humble Oil & Refining Co. 1 Marrero Land & Imp. Assoc., Ltd., 28-18s-22e, top sand 7,750 ft., TD 9,345 ft., perf. 7,750-53 ft., IP: 159 bbl. oil per day, 9/64-in. choke, GOR 698, TP 750 psi., 31.2° gravity.

Rapides Parish: New Wilcox discovery in Big Island area, 1 mi. N of Big Island production, 11-4n-3e, top sand 5,56_ ft., perf. 5,565 ft., TD 10,223 ft., IP: 390 bbl. oil per day, 14/64-in. choke, GOR 504, TP 700 psi., CP 800 psi., 46.9° gravity.

PERMIAN BASIN

Another Well Assured In Pegasus Trend

MIDLAND.—A Pennsylvanian discovery, 4½ miles west and 1 mile north of Pegasus Ellenburger and Pennsylvanian field, was assured this week at General American Oil Co. of Texas 1 Josie F. Peck, NW NW 21-41-T4S-T&P. Following the drill-stem test, below, in top of the formation, it was drilling ahead at 10,402 ft. Plans were to penetrate the formation before making further tests.

At depth of 10,369 ft., with packer set at 10,114 ft., a 3½-hour test was made, using 1,100 ft. of water blanket and ⅝-in. bottom choke. Gas showed in 17 minutes, estimated at 218,000 cu. ft. daily. Later tests on gas volume were to be made through separator, it was said. Water cushion flowed in 1 hour and 50 minutes, and oil in 2 hours and 3 minutes. Flowing by heads, it was estimated to be making 20-25 bbl. of oil an hour. Recovery was 4,600 ft. of fluid, being 2,300 ft. of free oil and 2,300 ft. of heavily oil and gas-cut water and mud. Flowing pressure ranged from 1,000-1,500 psi. Mechanical trouble prevented a bottom-hole gage on built-up pressure.

York & Harper, Inc., 1A Gulf-TXL, approximately NE SW 25-39-T3S-T&P, placed tentative top on the Fusselman section at 12,625 ft., then ran a 2½-hour drill-stem test from 12,573-12,685 ft., which produced a good blow throughout. Gas showed after 16 stands of drill pipe had been pulled. Recovery was 990 ft. of gas-cut mud, 850 ft. of free oil, and 3,240 ft. of oil and mud-cut water blanket. Operators said the water blanket was estimated to be 60 per cent oil. At last report it was swabbing mud from total depth of 12,685 ft. Location is on a Gulf farmout and is 1½ miles northwest of Gulf's 1-E Bryant, Ellenburger failure which had some shows in the Fusselman.

Scurry County.—Recompletion of an old dry hole on the northwest end of Sharon Ridge 1,700-ft. field as a Clear Fork discovery was made by Cities Service Oil Co. The 1 W. F. Burney, 2,310 ft. from west and 681 ft. from south lines, north half, 143-97-H&TC, plugged back to 3,250 ft., and completed on the pump for 60.7 bbl. of 30°-gravity oil a day. Top of pay was 3,004 ft.

Hiawatha Oil & Gas Co. made location for a 3,300-ft. Clear Fork test in Diamond M. field, approximately 1,000 ft. northwest of their 7 Wilson, Clear Fork discovery for the field: The new well is to be the 8 Wilson, 1,650 ft. from west and 990 ft. from south lines, 183-97-H&TC.

One mile southeast of Standard-Fryer 1 Wilkirson, William Hamm, Jr., 1 J. A. Joyce, 16-1-J. P. Smith Survey, topped the reef lime at 6,662 ft., on elevation of 2,367 ft. A drill-stem test from 6,672-6,712 ft., open 31 minutes, produced a strong blow immediately, showed gas in 5 minutes, mud in 23 minutes, oil-cut mud in 24 minutes and clean oil in 27 minutes. It made a steady flow of oil, estimated at 50 bbl. an hour. Bottom-hole shut-in pressure was 3,025 psi. in 15 minutes. Operators were to drill another 50 ft. and test again.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCAT

Scurry County: S. B. Roberts 1 Burl H. Lewis, SW SE 246-97-H&TC, 2¾ mi. NW Kelley field, 3½ mi. NE Diamond M field, TD 6,868 ft., elevation 2,438 ft., top Reef 6,836 ft., top pay 6,838 ft., 5½-in. casing set to 6,840 ft., IP flowed 610.5 bbl. 42°-gravity oil a day, ½-in. choke, GOR 800 cu. ft., TP 250 psi.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Cascade Petroleum Co. 1 J. E. Parker, NE SE 27-A44-PSL, 1 mi. E Fuhrman-Mascho field, dry, TD 4,956 ft., elevation 3,137 ft., Grayburg 4,525 ft.

Crockett County: Cities Service Oil Co. 1-AB Shannon, approximately SW SW 40-BB-TCRR, 2 mi. SW World field, dry, TD 9,222 ft., elevation 2,746 ft., Yates 1,650 ft., Grayburg 2,670 ft., San Andres 2,885 ft., San Angelo 3,270 ft., Clear Fork 4,050 ft., Ellenburger 8,850 ft.

Mitchell County: Shamrock Oil Corp. et al 1 Powell, 81-27-T&P, 7½ mi. SW Colorado City, dry, TD 9,445 ft., elevation 2,095 ft., San Andres 1,300 ft., San Angelo 1,940 ft., Clearfork 2,160 ft.

Hunt Oil Co. 2 Elsinore Royalty Co., 1-C-GC&SF, 7 mi. E Chancellor, 15 mi. SW Fort Stockton, dry, TD 2,057 ft., elevation 3,253 ft., completed as water well.

Runnels County: Delaware Drillers, Inc., 1 Ben Nitsch, 660 ft. from N, 212 ft. from W lines, Sec. 326, W. M. Baggs Sur., 1½ mi. E Winters, dry, TD 4,610 ft., elevation 1,879 ft., Valera 962 ft., Saddle Creek 1,880 ft., Palo Pinto 3,637 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—T. P. Coal & Oil Co. 1-B State, Account 1, 2-12s-33e, northeast outpost to Bagley Devonian field, drilled out cement from 7-in. casing set at 10,765 ft., and was swabbing some oil, with fluid level standing at 3,200 ft. Before setting pipe it flowed 20 bbl. of oil in 1½ hours on drill-stem test. Total depth was 10,194 ft.

The Texas Co. 1 Ertel, 27-16s-38e, wildcat 3½ miles north of Knowles field, ran a 2-hour drill-stem test in unidentified section from 8,800-8,928 ft. It produced a fair blow for 75 minutes and a light blow for 45 minutes, and recovered 350 ft. of oil and gas-cut mud. Shut-in pressure was 350 psi. in 15 minutes. Drilling continued below 9,023 ft. in hard lime and dolomite.

Completion was reported on Amerada Petroleum Corp. 1 Rose Evans, south offset to the Knowles discovery, 35-16s-38e. Total depth was 12,575 ft. On elevation of 3,712 ft., it had top of pay at 12,450 ft., and from 184 perforations at 12,550-73 ft. it flowed 883 bbl. of 47.9°-gravity oil a day, through ½-in. choke. Gas-oil ratio was 148 cu. ft.

Humble Oil & Refining Co. 1 Federal-Wiggs, 31-24s-27e, 16 miles south of Carlsbad, was drilling in lime below 13,286 ft., following an attempted drill-stem test at 12,927-70 ft.

In Chaves County, Honolulu Oil Corp. 1 Texas Co.-State, 13-11s-27e, 18 miles southeast of Roswell, was drilling below 2,080 ft., following a 3-hour and 15-minute drill-stem test at 1,986-2,050 ft. in the San Andres. Recovery was 1,150 ft. of oil.

SOUTHWEST TEXAS

Casing Perforated on Aransas County Prospect

CORPUS CHRISTI.—Ryan, Hays, & Burke have perforated the casing in the 1 Margaret E. Davis, and through a 5/32-in. choke the well flowed 1,500 M.c.f. gas per day and 8 gal. of condensate every 2 minutes, 45 seconds. Hole is totaled to 9,263 ft. and operator is testing through perforations at 9,246-53 ft. This new discovery is located 10 miles west of Rockport, in Section 7, Block 48, resubdivision, Sixth Addition, Taft Farm Lands, Aransas County.

No details have yet been released on the Taylor Refining Co. and Mayfair Minerals 1 B. F. M. Klump, "tight" wildcat 8 miles south of Pharr, Hidalgo County. With 5½-in. liner set to total depth of 10,407 ft., the well is flowing oil but will be tested several days before detailed information is released.

Meanwhile, Taylor & Mayfair skidded the rig from Klump to the 1 Roy Barnes, confirmation test to the new pool. The Barnes is 1,729 ft. due west of the Klump and is contracted to 12,000 ft.

In Webb County, 6½ miles north and slightly west of the Lopez field, Shell Oil Co., Inc., 1 Duval County Ranch Co. is drilling below 7,500 ft. in shale on an 8,500-ft. contract. The wildcat recovered 192 ft. of gas-cut mud on 22-minute drill-stem test at 6,829-65 ft. through ¼-in. top and ½-in. bottom chokes. There was fair blow

at surface, and bottom-hole pressures were 505 and 2,032 psi.

Southern Minerals Corp. 1 J. A. McFaddin Estate, wildcat in IRR Survey, Abstract 399, 10 miles north of Victoria, cored shale with gas odor at 5,824-57 ft. Sands with oil and gas odor were cored at 5,961-66 ft. and core at 5,966-71 ft. recovered sand with oil and gas odor. Brittle shale with gas odor was recovered at 6,976 ft. and at 6,976-81 ft., sand with oil and gas odor was recovered. Well is waiting on cement after cementing pipe in the hole at 5,986 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bastrop County: G. and B. H. Cabbell 1 Dewey Turner, 118-acre lease, Addison Litton Sur., 1 mi. northeast Cedar Creek, dry, TD 2,386 ft.

Duval County: American Eagle Oil Co. 1 Cain & Cain & Smith, GH&H RR Sur. 81, 6 mi. north of Benavides, dry, TD 2,660 ft.

Lundell Brothers 1 Zaragosa Lopez, AB&M Sur. 731, 163-acre lease, 15 mi. northeast of San Diego, dry, TD 5,455 ft.

Jim Hogg County: Cam Corp. 1 Alfonso Trevino Estate, 260-acre lease, Las Cuevitas Gr., 30 mi. south of Hebbronville, dry, TD 3,014 ft

Kenedy County: Humble Oil & Refining Co. D-1 J. G. Kenedy, Jr., 24,864-3-acre "D" lease, Marcello Pasture, 10 mi. east of Mifflin, dry, TD 11,965 ft.

Nueces County: Humble Oil & Refining Co. G-2 King Ranch-East Laureles, SE corner Tract 123, Laureles Farm, Rincon de los Laureles Gr., TA as potential gas well, TD 9,960 ft.

San Patricio County: Atlantic Refining Co. B-1 F. E. Serviere, second addition to Taft Farm lands, Reuben Ross Sur. A-227, 3 mi. northeast of Taft, dry, TD 5,930 ft.

Starr County: The Texas Co. 1 W. L. Hart et al, Nicholas Zamora Sur. A-282, 652-acre lease, 8½ mi. northeast of Grulla, dry, TD 5,450 ft.

Travis County: Tamd Oil Corp. 1 A. McCaleb, 149-acre lease, James Gilliland Sur., 12 mi. south of Manor, dry, TD 1,605 ft.

EASTERN TEXAS

Hollandsworth Drills Past Noncommercial Oil Show

DALLAS.—Hollandsworth Oil Co. 1 Paul H. McKnight, W. R. Jones Survey, Survey, north outpost test to Hawkins field, Wood County, found some oil in the sub-Clarksville but considered it noncommercial and was drilling ahead to the Woodbine.

Two drill-stem tests of the sub-Clarksville, from 4,540-4,606 ft., recovered 500 ft. of oil-cut mud on the first, and 100 ft. of mud and 100 ft. of mud-cut oil on the second. Sample top on the section was 4,553 ft., on elevation of 346 ft.

In the Pine Mills area, F. R. Jackson and others 2 J. A. Durrett, located 1,000 ft. southwest of the discovery, started coring at 4,800 ft., in the sub-Clarksville.

Sohio Petroleum Co. 1 G. T. Turner, David Gilleland Survey, and 660 ft. from the Pine Mills discovery well, completed for an initial production of 153 bbl. of 27.2°-gravity oil through ¼-in. choke in 24 hours. Flowing pressure was 60 psi. on tubing, and shut-in pressure was 325 psi. Total depth was 5,656 ft., with casing perforations in sand from 4,798-4,810 ft.

A new test for the area was located approximately 1 mile northeast of the Pine Mills townsite and 3 miles northwest of the field. It is Jackson and associates' 1 G. W. Reed, in the E. C. Lane Survey, which is projected to the Woodbine, expected around 6,300 ft.

In the Mineola area, Humble 1 H. Watts, Francis Holland Survey, was dry at 4,741 ft., with salt water in the sub-Clarksville. Top on the formation was not reported. Location is 933 ft. northeast of the 1 Joe Carr, completed this year for 50 bbl. of 18°-gravity oil a day, on the pump, from perforations at 4,612-38 ft.

Application was filed with the Texas Railroad Commission by S. J. Carnes, of Camden, Ark., to reenter an abandoned wildcat in the R. S. Forbes Survey of Shelby County, 6 miles east of Patroon. The well was drilled in 1948 by M. E. Davis to 6,015 ft., apparently in the Pettit limestone. Reports indicated there was some oil seepage from the well.

In Nacogdoches County, Humble started tests at its 1 Mary R. Saner, hole No. 2, 4 miles northeast of Trawick, in the Charles Holmes Survey. Previous drill-stem tests at 6,859-6,914 ft. and 6,923-44 ft. indicated gas. Location is about 2 miles northeast of Humble 1 Thurman Crawford, Trawick field Pettit gas discovery and only producer in the area. Location for a future test was made by Humble on a 675-acre Sammie Weatherly Rogers tract, Luis Sanchez Survey.

EAST TEXAS (DISTRICTS 5, 6, AND 6-P) WILDCAT FAILURE

Red River County: Homer Easterwood 1 H. E. Brooks, 82-acre tract in W. Becknell and I. Kuykendall Sur., ⅛ mi. SW Bagwell townsite, dry, TD 1,836 ft., elev. 500 ft., base Goodland-top Paluxy 1,814 ft., Paluxy carried salt water.

LA.-ARK.

Prospective New Oiler in Bossier City Field Shut in

SHREVEPORT.—Burnham-Browning et al 1 F. O. Gilbert, 34-18n-15w, prospective new producer in the new Bossier City field, Bossier Parish, cleaned itself into pits and flowed some oil, but due to its location within the city limits and the attendant fire hazard, was shut in until storage and separators are set up.

Some observers believed the Gilbert test would surpass the discovery drilled by McAlester Fuel Co. in 27-18n-13w, approximately 1 mile to the north, but details on the new well were not available. Total depth on the 1 Gilbert was 5,665 ft., in the Pettit lime, with 81 shots placed from 5,541-51 ft.

Gulf Refining Co. 1 Biedenharn, 23-21n-14w, Bossier Parish, was waiting on orders at 3,225 ft.

In Arkansas, approximately 10 miles north of Garland City, Miller County, Crow Drilling Co. was said to have completed a core check of the Pettit zone at Garland Anthony and Jennings 2 Smith, which was originally drilled in 1946. There were no shows in cores from 4,611-50 ft., and it was to be abandoned.

Operations were said to have been resumed at Garland Anthony 1 E. A. Price, 18-6s-25w, near Garland City. According to report, the well was drilling ahead below 5,150 ft.

The usual weekly report on exploration activities was delayed by the mid-week holiday.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: Gulf Refining Co. 1 R. Z. Biedenharn, 23-21n-14w, dry, TD 3,220 ft.

C. H. Murphy and G. H. Vaughn 1 Crystal Oil & Refining Co., NW NW 14-21n-12w, dry, TD 9,508 ft.

Clark Sample 1 Rhodes, 34-20n-12w, dry, TD 1,275 ft., elev. 242 ft., Nacatoch 1,096 ft.

Madison Parish: H. Barksdale 1 J. K. Mahoney, 44-17n-13e, dry, TD 4,505 ft.

Singer Manufacturing Co. 1 fee, CE½ NW SW 11-16n-11e, dry, TD 5,514 ft., elev. 84 ft., Cane River 1,997 ft., Wilcox 2,375 ft., Midway 3,840 ft., Arkadelphia 4,270 ft., gas rock 4,290 ft., Tuscaloosa 4,318 ft., Paluxy 5,340 ft.

ARKANSAS WILDCAT FAILURE

Union County: C. H. Murphy 1 Loutre

Shingle Co., NE NW 6-19s-14w, dry, TD 2,192 ft., elev. 153 ft., Midway 1,943 (?) ft., Arkadelphia 1,977 ft., Nacatoch 2,126 ft.

TEXAS GULF COAST

Magnolia Testing Oil at Austin County Venture

HOUSTON.—Magnolia Petroleum Co. is continuing to test oil in 1 Joe Vitek, just off the west side of the San Felipe Dome, Austin County. Operators have been delayed by a fish job after making several drill-stem tests which recovered oil-cut mud. Well is now testing oil and salt water through perforations at 8,148-49 ft. and operators are trying to squeeze off salt water for a flow. The test is in the S. F. Austin League, Abstract 7, 1 mile southwest of McDowell townsite.

Operators have set 7-in. string in the McCarthy Oil & Gas Corp. 1-A Leo Schiller et al, another Austin County wildcat 4½ miles east of New Ulm. Hole is bottomed at 10,300 ft. and projected depth is 12,000 ft.

Chicago Corp. 1 John Drlik, Colorado County gas discovery, has been shut in. The test has not been gaged, but is producing through perforations at 6,430-34 ft. It is located in the Sam Kennelly Survey, Abstract 30, 1 mile northwest of Garwood.

On the southwest flank of the Hull Dome, Liberty County, testing operations are continuing at the General Crude Oil Co. 5 Phoenix Development Co., Jesse Devore Survey. The wildcat has 5½-in. casing set at 5,769 ft. and first perforations from 5,532-42 ft. have been squeezed.

Ohio Oil Co. and Melben Oil Co. have resumed operations on their Gulf of Mexico test after repairing hurricane damage and are now drilling below 8,000 ft. The offshore wildcat, State Lease 31,794-Tract 403, is projected to 12,500 ft.

H. L. Hunt is approximately one-third of the way down in the 1 J. C. McGregor, wildcat located in Alvin townsite, Brazoria County, and is drilling below 3,061 ft. Test is located in the HT&B Survey, A-449, and is projected to 11,500 ft.

The 57 new locations on the Texas Gulf Coast include 7 wildcat starts, 1 each in Lee, Washington, Wharton, Calhoun, Jackson, and Victoria counties and 2 in Bee County. There was one successful exploratory test completed in Goliad County, while seven were dry, one each in Colorado, Harris, Wharton, Lavaca, and Williamson counties and two in Gonzales County.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Goliad County: New pay at So. Cabeza Creek—Continental Oil Co. 3 Elmo Reed, Geo. Elliott Sur., A-119, 15 mi. NW of Goliad, top sand 4,780 ft., TD 8,371 ft., perf. 4,780-87 ft., IP: 48 bbl. oil per day on gas lift, GOR 141, TP 0, CP 500 psi, grav. 44.8°.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Colorado County: Grubb & Hawkins 1 Arnold R. Tagge et al, Samuel Fowler Sur., A-210, 6 mi. W of Sheridan, dry, TD 9,330 ft.

Gonzales County: W. F. Dolgener 1 C. E. Littlefield, Russell Ward Sur., A-468, 4 mi. S of Harwood, dry, TD 403 ft.

W. O. Woodward, Trustee, 1 Tilda DuBose et al, E. G. Coffman Sur., 1¾ mi. W of Guadalupe River, 11 mi. SE of Gonzales townsite, dry, TD 6,014 ft.

Harris County: Humble Oil & Refining Co. 1 John Skorupinski, West Bammel area, Benjamin Harrington Sur., A-988, 11 mi. SE of Tomball, dry, TD 7,508 ft.

Lavaca County: H. L. Hunt Oil Co. 1 R. K. Smothers et ux, E. W. King Sur., A-660, ⅘ mi. NE of Hassie Hunt Trust Est. 1 R. L. Smothers gas discovery well, 3 mi. E of Ezell, dry, TD 5,555 ft.

Wharton County: Robert Flanagan and William Perlman 1 Wm. M. Wilbeck,

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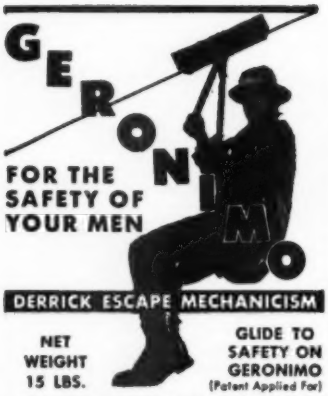

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G. W. Reynolds Sur. 76, A-484, 1¾ mi. NW of Pierce, dry, TD 6,034 ft.

Williamson County: Harry J. Stewart 1 Gottlob Riethmayer, Peter Cartwright Sur., 6½ mi. SE of Taylor, dry, TD 1,273 ft.

ROCKY MOUNTAIN

Ohio Running Casing on Gurley Pool Outpost Test

DENVER.—On drill-stem test in the Third Dakota sand at an outpost well in the Gurley pool, Cheyenne County, Nebraska, Ohio Oil Co. recovered oil and salt water and the company is now running casing to total depth prior to perforating and testing the zone. The well is 3 W. T. Knievel, SW SW SE 2-15n-49w, two locations northwest of the Gurley pool discovery well. Third Dakota was found at 4,489 ft. and the operator cored soft, well-saturated sand to 4,495 ft. Below 4,509 ft. the well again showed salt water, but this has been cased off. On drill-stem test in the top of the sand the operator recovered 1,580 ft. of 34°-gravity oil and 180 ft. of salty, watercut mud in 45 minutes. Salt water was recovered in tests of the First Dakota and salt water with gas was found in the Second Dakota between 4,428-50 ft. Production in this field, where Ohio made a discovery in May of this year, is from the First Dakota in four wells. One well, 1 Knievel, NE SE SE Section 2, was drilled through the Dakota series and was plugged back after finding staining in the third sand. The operator was unable to obtain commercial production from the First Dakota sand and the well has been converted to a salt-water disposal well. The Gurley pool was the first commercial discovery of oil in the western part of the state.

Water was found in the Nugget sand by Pure Oil Co. 2 Government, NW SE NW 29-2s-102w, West Douglas Creek wildcat, Rio Blanco County, Colorado. Top of Nugget was found at 6,096 ft. and on drill-stem test 6,093-6,130 ft. the well made 2,812 ft. of salt water with some gas odor. Pure found shows of gas in the Dakota, but the sand was hard and tight and shows were not commercial. This is the second well to be drilled on this unitized block, with the first a dry hole in the Weber sand. This first well was drilled by General Petroleum Corp. last year and the block farmed out from them to Pure on a 50-50 basis for the second well.

Steelco Drilling Co., Chicago, is preparing to test shows in the Dakota sand at its 1 McDonald, SW NE SE 32-34n-75w, in the Glenrock area, Converse County, Wyoming. The well was drilled to 7,228 ft., total depth, with top of Dakota logged at 7,210 ft. Cores between 7,210-20 ft. showed staining. This wildcat is located on a seismic high on the south side of the Powder River Basin in an area where there has been considerable seismic work during the past year. Phillips Petroleum Co. has a large lease block in the area, surrounding the Steelco acreage, and is reportedly contributing to the well.

New locations.—There were 31 new locations with 21 in Wyoming, 6 in Montana, and 2 each in Utah and western Nebraska. In Wyoming location was made by British-American Oil Producing Co. for a wildcat test in the Green Mountain area, at 1 Bossel, NE SW SW 2-28n-94w, Fremont County, northwest of the Happy Springs Unit. The well will be a 6,500-ft. Nugget sand test, but was spudded only and will be drilled early next spring. In Montana, Texas Pacific Coal & Oil Co. is moving in material for an interesting Amsden test in the Chimney Butte area, Musselshell County. The well will be 1 Northern Pacific, SE NW NE 11-7n-27e, southeast of the Big Wall area and east of Melstone. Texas Pacific has done seismic work in the area.

WYOMING WILDCAT FAILURES

East Adon, Campbell County: Amerada Petroleum Corp. 1 Unit, C NW SW 14-52n-69w; 6,511 ft. TD; abnd.; Pierre 1,920 ft., Mowry 5,568 ft., Newcastle 5,766 ft., Base Newcastle 5,794 ft., Cloverly 6,013 ft., Sundance 6,413 ft.

Grenville, Carbon County: Sinclair Oil & Gas Co. et al 1 Unit, SW SE NE 28-21n-86w; 3,341 ft. TD; abnd.; Dakota 301 ft., Lakota 338 ft., Morrison 382 ft., Sundance 647 ft., Nugget 755 ft., Chugwater 848 ft., Alcova 1,315 ft., Embar 2,015 ft., Tensleep 2,275 ft., Amsden 2,855 ft., Madison 3,213 ft., Cambrian 3,327 ft.

WYOMING SUCCESSFUL WILDCAT

NW Lodgepole, Weston County: Esperado Mining Co. 1 Government, C SE SW 16-45n-67w, 7,718 ft. TD; PB 7,380 ft., flowed average 30 bbl. oil per day; Niobrara 5,780 ft., Frontier 6,132 ft., Newcastle 7,233 ft., Dakota 7,480 ft., Fuson 7,570 ft., Morrison 7,654 ft.

COLORADO WILDCAT FAILURE

Alexander Block, Logan County: Fred M. Manning, Inc., 1 Linvill, C SW SE 6-7n-53w; 5,275 ft. TD; abnd.; Niobrara 3,970 ft., Timpas 4,310 ft., Base Timpas 4,370 ft., Greenhorn 4,570 ft., Muddy 4,840 ft., Dakota 4,938 ft., Fuson 5,022 ft., Lakota 5,214 ft.

NORTH DAKOTA WILDCAT FAILURES

Minot area, Ward County: Karnes et al 1 Kline, SE SE SE 16-157n-85w; 8,435 ft. TD; abnd.; Pierre 1,000 ft., Niobrara

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STATEMENT OF CONDITION

November 1, 1949

RESOURCES

Cash and Due from Banks	$49,146,405.59	
U. S. Government Securities	79,840,362.38	
Other Bonds and Warrants	4,665,595.65	$133,652,363.62
Loans and Discounts		34,891,522.05
Overdrafts		1,065.09
Income Receivable Accrued		531,754.08
Prepaid Expenses		47,568.96
Stock in Federal Reserve Bank		180,000.00
Bank Premises		2,000,000.00
Customers' Liability Under Acceptances		50,978.40
TOTAL		$171,355,252.20

LIABILITIES

Deposits		$150,599,175.23
Acceptances Executed		50,978.40
Income Collected, Not Earned		149,302.45
Reserve for Taxes, Interest, Etc.		717,198.07
Dividends Declared*		150,000.00
Bills Payable		9,000,000.00
Capital—Common	$3,000,000.00	
Surplus	3,000,000.00	
Undivided Profits and Reserves	4,688,598.05	10,688,598.05
TOTAL		$171,355,252.20

*Payable $75,000.00 January 13, 1950; $75,000.00 April 14, 1950

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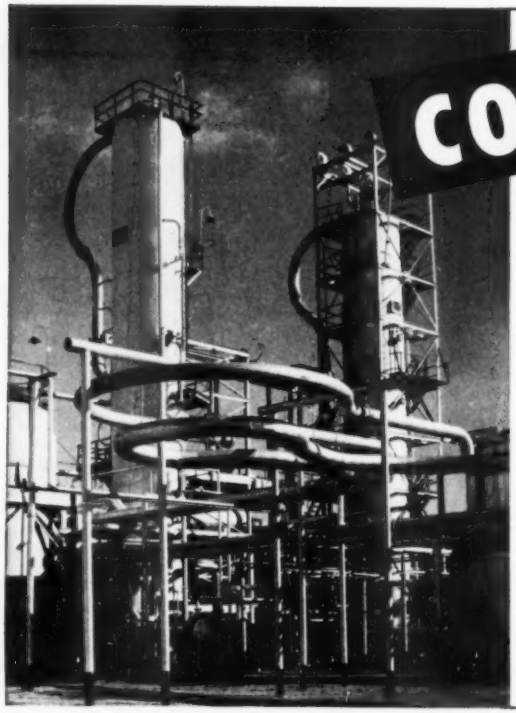

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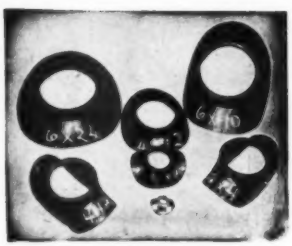

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2,325 ft., Benton 2,515 ft., Dakota 3,412 ft., Lakota 3,580 ft., Morrison 3,770 ft., Ellis 3,920 (?) ft., Spearfish 4,675 ft., Minnekahta 5,155 ft., Kibbey 5,410 ft., Madison 5,640 ft.

Devils Lake area, Ramsey County: Union et al 1 Aaanstad, C NE NE 29-159n-62w, dry, TD 3,223 ft. (?) in granite, tight hole.

UTAH WILDCAT FAILURE

Naples area, Uintah County: Baird & Robins 1 Slaugh, C SE SW 4-5s-22e; 5,900 ft. TD; abnd.; Frontier 2,100 ft., Dakota 2,470 ft., Morrison 2,530 ft., Curtis 3,400 ft., Entrada 3,500 ft., Navajo 3,796 ft., Chinle 4,585 ft., Shinarump 4,785 ft., Weber 5,810 (?) ft.

N. CENTRAL TEXAS

Hancock Area Gets Southeast Extension

WICHITA FALLS.—A 2,000-ft. southeast extension to the Hancock area 9 miles south of Wichita Falls was reported this week. George W. Graham 1 J. T. Gant, W. A. Keene Survey, A-1175, was shot with 40 qt. of nitro from 4,724-34 ft., then completed on the pump for 87.5 bbl. of 41°-gravity oil a day.

J. J. Lynn 1 J. L. O'Keefe, wildcat 2 miles southeast of King-Wilson field, Lot 32, Block 5, Clark & Plumb Subdivision, 5 miles southeast of Archer City, was reported dry at 4,210 ft., total depth.

Same operators were drilling below surface pipe at their 3 A. J. DeMoss, new semiwildcat 5 miles southeast of Archer City, in Lot 17, Block 5, Clark & Plumb Subdivision. Contract depth was to 4,200 ft. with rotary.

Jack County.—Mid-Continent Petroleum Corp. 2-A G. W. Fowler, semiwildcat 4 miles southwest of Cundiff, H. Simpson Survey, A-1654, set plug at 5,635 ft., and was testing the conglomerate from 5,488-5,506 ft. Early reports indicated it was making some 2,500,000 cu. ft. of gas daily.

Mid-Continent 1 Roy Cherryhomes, 2 miles northwest of Cundiff, J. Irvine Survey, A-313, ran a 1-hour drill-stem test in top of the conglomerate at 5,297-5,324 ft. which recovered 30 ft. of mud. It was drilling ahead at 5,490 ft.

Montague County.—Whitson and others 1 Carrie Maddox, semiwildcat about ½ mile north of Belcherville field, and 1 mile north of the Belcherville townsite set surface pipe at 594 ft., and was drilling ahead below 2,372 ft. in shale, on a 5,000-ft. contract. Location is in the W. Netherly Survey, A-566, on a C. U. Ray farmout.

Konrad Sztykgold 1 R. S. Whitecotton, 4½ miles northwest of Montague, H. Ravenstone Survey, A-638, was waiting on cement after squeezing perforations at 6,225-27 ft.

Throckmorton County.—Ten miles west of Throckmorton, L. F. Cox and others 1 A. E. Montgomery, Section 127, BBB&C Survey, estimated top of the Caddo lime at 4,735 ft. It drilled lime with a light oil show from 4,735-45 ft., and a drill-stem test of that section, open 90 minutes, recovered 30 ft. of slightly gas-cut mud. Bottom-hole pressure was 120 psi. in 20 minutes. A second test of 90 minutes from 4,747-61 ft. again recovered 30 ft. of mud. Drilling continued below 4,883 ft.

Superior Oil Co. 2 F. E. Foster, stepout test in Section 3,061, TE&L Survey, 8 miles northeast of Throckmorton, topped the Caddo at 4,517 ft. and had saturated lime from 4,517-19 ft. Cored from 4,519-44 ft., recovery was 25 ft. of lime. A 2-hour drill-stem test from 4,518-44 ft. recovered 3,900 ft. of gas and 90 ft. of heavily oil-cut mud. Bottom-hole pressure was 475 psi. in 20 minutes. Drilling continued below 4,665 ft. in lime and shale.

Warren Oil Corp. 1 Malcolm, 3½ miles southeast of production, and 3½ miles northeast of Woodson, topped the Caddo at an estimated 3,852 ft. It had dry lime to 3,860 ft., but found oil shows from 3,860-66 ft. A 2-hour drill-stem test of the latter section recovered 300 ft. of gas and 25 ft. of oil and gas-cut mud. Further oil shows were logged from 3,866-86 ft., and a 2-hour test recovered 10 ft. of lightly gas-cut mud. A third test from 3,940-50 ft. had about the same recovery, and drilling was continued below 4,015 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: J. J. Lynn 1 A. J. DeMoss, 330 ft. from N and W lines, Lot 18, Blk. 5, Clark & Plumb Sur., 5 mi. SE Archer City, TD 3,608 ft., elev. 1,040 ft., top Strawn pay 3,608 ft., flowed 302 bbl. of 42°-gravity oil a day, 16/64-in. choke, CP 675 psi., TP 350 psi.

Clay County: Akin & Dimock 1 G. W. Chapman, 330 ft. from E, 1,350 ft. from S lines, Blk. 18, Hopkins CSL, A-176, 2 mi. SW Blue Grove, TD 4,725 ft., PB 4,660 ft., top pay 4,651 ft., pumped 72 bbl. of 42°-gravity oil a day, 20 bbl. water, GOR 150 cu. ft.

Wilder & Underwood 1 J. B. Dunn "A," Blk. 24, Byers Bros. Subd., 3 mi. E Petrolia, TD 1,862 ft., top pay 1,858 ft., pumped 46 bbl. of oil a day.

Jack County: Russell Maguire 1 H. L. Roper, 330 ft. from E and S lines, Blk. 21, Lge. 2, Henderson CSL, 2 mi. NW Joplin, TD 4,609 ft., top conglomerate pay 4,592 ft., flowed 151.7 bbl. of 42°-gravity oil a day, 16/64-in. choke, GOR 600 cu. ft., CP 400 psi., TP 125 psi.

Jones County: S. C. Herring Drilling Co. 1 C. P. Amerson, 117-1-BBB&C Sur., 11 mi. W Stamford, TD 3,073 ft., top King lime pay 3,053 ft., pumped 5 bbl. of 40°-gravity oil a day, 5 bbl. water.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Henry Grace Production Co. 1 Bertha Coffelt, Blk. 99, J. W. Harris Subd., 5 mi. W Archer City, dry, TD 1,404 ft.

J. J. Lynn 1 J. L. O'Keefe, Lot 32, Blk. 5, Clark & Plumb Subd., 5 mi. SE Archer City, dry, TD 4,210 ft.

Baylor County: Kingery Bros. and A. R. McElreath 1 B. M. E. Smith est., NW NW Sec. 97, T&NO Sur., 6 mi. SW Seymour, dry, TD 5,585 ft., Mississippian 5,557-85 ft.

Bosque County: C. M. Buie 1 A. M. Anderson, J. B. Brown Sur., 5 mi. NE Clifton, dry, TD 5,532 ft., elev. 772 ft., Trinity 480 ft., Burnett 5,280 ft., Ellenburger 5,332 ft.

Callahan County: E. P. Griffin and T. A. Kirk 1 Powell & Ligget, NE NE Lot 21, Lge. 337, Victorian CSL, 5 mi. W Admiral, dry, TD 4,307 ft., elev. 1,900 ft., Palo Pinto 2,307 ft., Fry sand 2,500 ft., Marble Falls 3,450 ft., Barnett 4,150 ft., Ellenburger 4,260 ft.

Trumpter Petroleum Corp. 1 Herman Betcher, Sec. 66, BOH Sur., 5 mi. NW Putnam, dry, TD 3,557 ft., elev. 1,434 ft., Caddo 3,262 ft.

Coleman County: West Bros. and A. Pepper 1 M. Hanke, Blk. 11, Comal CSL, Sur. 181, 4 mi. NW Burnett, dry, TD 543 ft.

Jack County: Jones Simpson Drilling Corp. 1 Worthington-Edwards, G. D. Spottswood Sur., A-520, 2 mi. S Avis, dry, TD 6,187 ft., elev. 912 ft., Ellenburger 6,000 ft., DST 6,107-57 ft., recovered 30 ft. oil-cut mud in 2 hr.

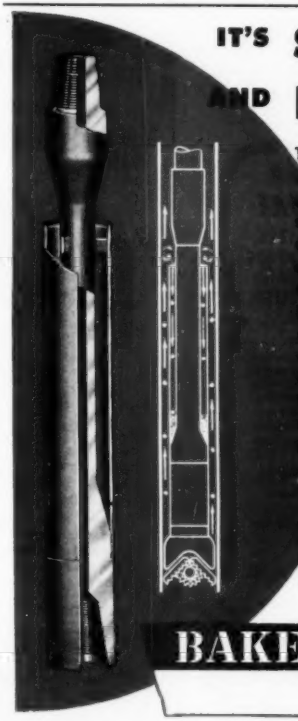
Jones County: Ungren & Frazier 1 E. L. Phillips, Harrison CSL, Sur. 333, 5 mi. NW Anson, dry, TD 3,160 ft., Flippen 2,582 ft., Swastika 3,070 ft.

Knox County: Bridwell Oil Co. 1 Effie Hardin, 97-2-D&W Sur., 3 mi. NW Mundy, dry, TD 2,102 ft., elev. 1,512 ft.

Lampasas County: W. & R. Oil Co. 1 J. R. Holly, Joseph Walker Sur., 3½ mi. N Adamsville, dry, TD 600 ft. in shale, elev. 1,101 ft.

Falo Pinto County: Creekmore Rooney Drilling Co. 1 G. W. Dye est., Sec. 879, TE&L Sur., 1 mi. E Graford, dry, TD 1,800 ft., elev. 953 ft.

J. J. Lynn 1-B J. K. Weldon, CEPI&M



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Sur., A-138, 12 mi. W Gratord, dry, TD 4,224 ft., elev. 1,087 ft., Caddo 3,635 ft., Marble Falls 3,813 ft., conglomerate 3,880 ft., Mississippian around 4,078 ft.

San Saba County: O. A. Hock and H. N. Stephenson 1 Germany est., Fred Kneese Sur. 86, 15 mi. NW Rickland Springs, dry, TD 1,410 ft., elev. 1,300 ft., completed as fresh water well.

CALIFORNIA

Boom Definitely Off in Placerita Canyon Field

LOS ANGELES.—The boom is definitely off in the Placerita Canyon field. Wells that have been flowing as much as 1,000 bbl. per day and better are now on the pump, and all new wells are pumpers, although a few have shown an initial, brief flow.

This is not to say that the field is depleted. Production still averages about 24,000 bbl. daily. But average per well has dropped sharply and now runs about 175 bbl. daily. In early October production averaged better than 500 bbl. daily per well.

Drilling activity is also slowing at Placerita with a few of the rigs moving out of the area. At the present time there are 14 wells drilling and locations staked for 13 more. This represents a one-third drop from the previous week. The only increase in activity is in the number of wells being deepened. As the wells go on pump many are being deepened to take full advantage of the producing interval.

At this time four tests are under way in the area of the Placerita field. These are all within 1 mile of present production and generally within the 90° arc between due east and south.

To the east Robert S. Rocco 1 D. & C. is plugged and testing at 3,480 ft. To the southeast, 1-3n-16w, E. M. Breen 1 Betsy Linda flowed fresh water and heavy oil after swabbing. Oil shows were topped at 1,350 ft.

Rothschild Oil Co. and Independent Exploration Co. have located a joint test in Section 6-3n-15w, 500 ft. southwest of the center of the section. C. E. O'Donnell Oil Co. has made location at 32-4n-15w.

Standard Oil's wildcat, 4-3 L.A.I., in the South Inglewood area, has been undergoing tests for the last 2 weeks. There has been no official reports on results. An electric log and dip-meter were run and 5-in. casing set. Total depth is 10,258 ft., with location in Section 20-2s-14w. The 1 Orangethorpe in Riverside County, widely reported some time ago as the first "oil find" in the county, is currently pumping 2 bbl. daily with 35 per cent cut.

The core hole of Pomona Tile Co. 1 has become a drilling test under the name 1 Pomona of Pomona Tile Manufacturing Co. Location is in San Mateo County, Half Moon Bay area. Present depth is 1,250 ft., and is in Section 16-7s-4w.

Union Oil Co. was able to recover only part of the fish in its deep test in the Santa Fe Springs field. The test, 107 Bell, reached 13,541 ft. and the lower part of the hole has now been abandoned and the well will most likely be completed in the Lower Clark or Hathaway round 7,500 ft. The well is plugged at 5,420 ft. and redrilling

In Ventura County, Thornbury-Oceanic, 33-4n-18w, Eureka Canyon area, has been abandoned following collapse of casing. Total depth is 1,723 ft. The 2 Thornbury-Oceanic, a few feet from the abandoned test, is swabbing water plus a little oil from 1,667 ft.

CALIFORNIA WILDCAT FAILURES

Fresno County, Coalinga area: Atlantic Oil Co. 1-36T, 36-19s-14e, dry, TD 889 ft., in Cretaceous, elev. 1,125 ft.

Barnsdall Oil Co. 1 J. M. & R., 28-19s-16e, dry, Kreyenhagen 7,967 ft., green sand 8,945 ft., first Gatchell 8,965 ft., main Gatchell 9,088 ft., Hondo 9,901 ft., TD 9,703 ft., elev. 492 ft.

Kern County, Comanche Point area: Leroy Gould & Associates 1 Claire, 36-32s-29e, dry, gray Santa Margarita 1,180 ft., TD 1,298 ft., elev. 935 ft.

Carla Stafford Lewis 1 Car Fran, 35-32s-29e, dry, brown shale 2,512-59 ft., granite 2,865 ft., TD 2,910 ft., elev. unknown.

Monterey County, Watsonville area: Barnes & Shadrick Drilling Co. 1 Springfield, 31-12s-2e, dry, TD 2,030 ft. in blue shale, elev. 20 ft.

San Luis Obispo County, Cuyama Valley area: R. B. Watkins 1 Rohmer, 14-11n-28w, dry, Dibblee 2,665 ft., Painted Rocks 2,748 ft., TD 3,134 ft., elev. 1,998 ft.

Santa Barbara County, Cuyama Valley area: Richfield Oil Corp. 1 Dixon A, 25-9n-25w, dry, TD 3,382 ft., elev. 3,256 ft.

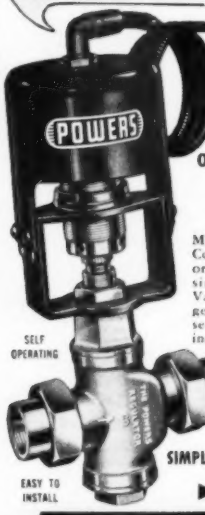
APPALACHIAN FIELD

Wildcat Finds Gas In Western Maryland

PITTSBURGH.—In Ryans Glade No. 8 district, Garrett County, Maryland, Cumberland & Allegheny Gas Co. completed a successful wildcat. Its S-424 Elmer N. Beachy, elevation 2,462 ft., wich gaged 581,000 cu. ft. of gas after acidizing in the chert. Total depth was 4,910 ft. The well is located on the Oakland Quadrangle, 600 ft. south of Latitude 39 degrees, 20 minutes, and 5,900 ft. east of Longitude 79 degrees, 25 minutes. The pay zone was topped at 4,403 ft., and production was at 4,454-56 ft.

In Elder Township, Cambria County,

CUT COSTS



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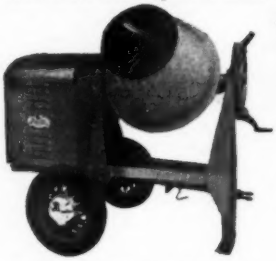

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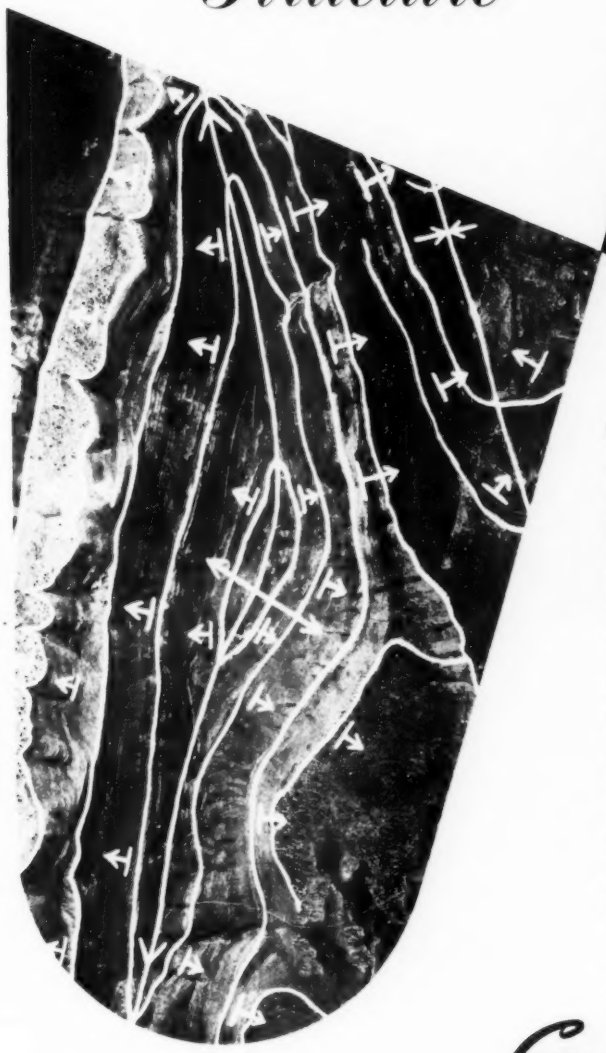

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Pennsylvania, Peoples Natural Gas Co. 2-3890 Clearfield Bituminous Coal Corp., elevation 1,702 ft., was reported dry at total depth 3,276 ft. In Wharton Township, Fayette County, William E. Snee et al 3 Indian Creek Coal & Coke Co. is drilling at 6,853 ft.; in Georges Township, Orville Eberly et al 1 N. E. Murphy is drilling at 6,320 ft.; in Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jesse B. Miller is drilling at 5,366 ft.

West Virginia operations included: Portland District, Preston County, Hope Natural Gas Co. 9391 John & Edna Murphy, elevation 2,152 ft., is shut down at 3,821 ft. after cementing the bailer in the hole; Snee & Eberly 2 Cora E. Lewis, elevation 1,953 ft., drilling at 4,582 ft.; Dry Fork District, Tucker County Cumberland & Allegheny Gas Co. 1-A-425 Jason Harman, elevation 3,304 ft., drilling at 6,585 ft.; Clay District, Hancock County, John T. Galey 1 Karol & Catherine Sobel, elevation 1,066 ft., drilling at 1,750 ft.

MARYLAND SUCCESSFUL WILDCAT

Garrett County, Ryans Glade No. 8 district: Cumberland & Allegheny Gas Co. S-424 Elmer N. Beachy, elevation 2,462 ft., 581,000 cu. ft. of gas from chert at 4,454-56 ft.; Tully lime 3,915-35 ft., chert 4,403-4,505 ft. Oriskany sand 4,520-4,659 ft., TD 4,910 ft.

PENNSYLVANIA WILDCAT FAILURE

Cambria County, Elder Township: Peoples Natural Gas Co. 2-3890 Clearfield Bituminous Coal Corp., elev. 1,702 ft., dry, TD 3,276 ft.

CANADIAN FIELDS

Pacific Petroleums, Ltd., Extends Redwater Oil Field

CALGARY, Alta.— Pacific Petroleums, Ltd., and Associates have made northeast and northwest extensions to the great Redwater oil field in Central Alberta. P.A.S. C.-C. Lease-Redwater 9-17, LSD 9, 17-58-22w4, in northwest Redwater, was completed at 3,256 ft. and encountered approximately 57 ft. of D3 Devonian zone oil pay. Crew is now preparing to run initial potential test at the well. The Pacific group plans to undertake immediate development of the whole north half of Section 17-58-22w4, on which the new success is located. In addition to the Commonwealth rig that drilled 9-17 well, another contract rig will be added, to give the group two rigs to develop that half section.

C.A.P.P.-Redwater 4-23e, LSD 4 23-58-22w4, in Northeast Redwater, is running casing after obtaining 50 ft. of limestone that showed good porosity. Hole has been drilled to 3,286 ft., about 36 ft. above the presumed water line.

The British Empire-Stettler 1, D2 Devonian zone oil discovery, has completed drilling and has production string of casing set. The well was carried down to 5,403 ft., still in green shale with no sign of the D3 zone. The hole has been cased with 7-in. string set at 5,299 ft. Casing will be perforated, production zone acidized, and the well placed on production test during next week.

There was approximately 26 ft. of oil-bearing porosity encountered in the D2 zone at the discovery well. The well flowed clean oil and sizable amounts of natural gas on several drill-stem tests in the D2 horizon. Site is in LSD 4 27-38-20w4, about 3 miles north of Canadian Gulf's D2 and D3 Devonian oil discovery at Stettler and around 95 miles northeast of Calgary.

Imperial-Jeffery 1, LSD 6 4-59-23w4, northwest stepout venture from the Redwater oil field ran a drill-stem test of D2 interval 2,881-2,917 ft., and received a maximum natural-gas flow rate of 4,300,000 cu. ft. daily which diminished to 3,480,000 cu. ft. daily on a ¾-hour test. There was no oil, water, or mud recovered when the drill pipe was pulled. Coring is now proceeding at 2,969 ft.

A natural-gas strike, small in volume, but important in its opening of oil and gas possibilities along the Pacific Coast, was made at Lulu Island, 10 miles south of the City of Vancouver.

The discovery well shows an estimated gas flow of 500,000 cu. ft. daily from a sand at the 800-ft. level. Backers of the well, Richmont Gas & Oil Co., plan to deepen the well in search of oil, and additional gas.

Royalite Oil Co., Ltd., of Calgary, expects to get drilling operations under way at Graham Island, British Columbia, by the beginning of December. Most of the drilling equipment has been transported to the well site and crew is now busily engaged rigging up. The exploratory test, Royalite-Quenn Charlotte 1, is off the northern coast of British Columbia, over 500 miles north of Vancouver, and about 100 miles southwest of Prince Rupert.

Ten wells were completed in Alberta during the week, seven as successful oil wells, and three wildcat abandonments. The new oil wells include: one at Golden Spike, two at Leduc, and four at Redwater.

At Golden Spike, Imperial Oil, Ltd., discoverer of the famed Schoepp 1 Golden Spike oil well that rated an initial potential of 12,000 bbl. daily, placed its second oil well on production. The new producer rated an initial potential of 2,712 bbl. daily. The company's first and second follow-up wells, 3 and 3½ miles northeast and northwest stepouts from the discovery, were abandoned after failing to find production. The third follow-up, the new oil well, was drilled ½ mile north of the discovery. It is expected that the rig from the new completion will move ½ mile east to the location that has been staked for Golden Spike 5. Drilling operations will likely get under way within the next few weeks.

At Redwater, Imperial placed two more wells on production to raise its total producers in that field to 74. Canadian Gulf Oil Co. added one more producer this week for a total of 30. The Dalhousie-Western Leaseholds team brought its fourth and final completion on its quarter section of Redwater acreage.

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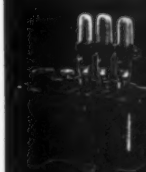

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CANADIAN WILDCAT FAILURES

Socony-Verdant Valley 1, LSD 14-28-18w4, TD 5,552 ft.

Gulf G. E. Upton 1, LSD 1 11-34-21-w4, TD 6,610 ft.

Redwater Leaseholds-Leduc Calmar-Stettler 1, LSD 3 1-39-20w4, TD 5,500 ft.

OHIO, KENTUCKY

Perry County Well Makes Good Oil, Gas Shows

COLUMBUS.—J. L. Swingle et al 1 Charles M. King, Section 9, Harrison Township, Perry County, the fourth producer to be completed in the new pool south of Roseville, drilled the Clinton sand at 3,470-3,520 ft., and showed for 150,000 cu. ft. of gas and 1,000 ft. of oil natural. In the first 24-hour period after a 125-qt. shot, the well made 50 bbl. and 500,000 cu. ft. of gas. Five wells are now drilling or ready to start in the area. In Hopewell Township, the Mid East 3 R. R. Weed, Section 33, found the Clinton at 2,947-88 ft. with 12 bbl. natural and 68 bbl. in 24 hours after a 110-qt. shot.

W. C. Adair et al 1 Sam Cooperider, Section 3, Bowling Green Township, Licking County, topped the Newburg at 2,402 ft. and drilled 2 ft. in, with an open flow of 480,000 cu. ft. natural. The well will be tubed and acidized.

Morrow Oil & Gas Co. completed a second small well in the Oriskany on 2 G. H. Hunt, Lot 33, Washington Township, Tuscarawas County. Sand at 3,628-42 ft. gaged 135,000 cu. ft. of gas natural and 225,000 cu. ft. after shot. Rock pressure was 1,190 lb. in 72 hours.

Preston Oil Co. 1 Clay Wilson, Section 4, Bedford Township, Meigs County, a north offset to the 3 Taylor, logged the Berea at 1,751-66 ft. After shot, the well flowed 35 bbl. and swabbed 7 bbl. in 24 hours.

Eighteen locations from 13 counties were reported for the week, Knox County having 3, while Noble, Perry, and Meigs had 2 each. Ashland field led in completions with 6 out of 25.

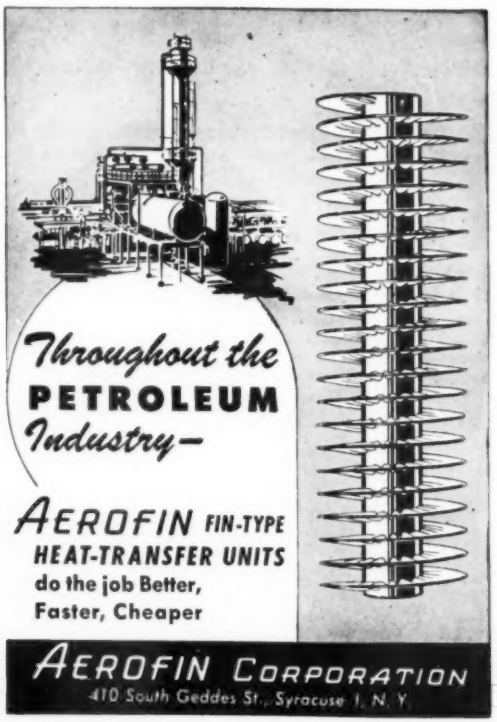
WESTERN KENTUCKY

OWENSBORO.—The new Caney Mound pool in eastern Union County, 3 miles northeast of Uniontown, added another prolific producer in the completion by Sinclair Oil & Gas Co. of its 2 Culver, which flowed 2,929 bbl. on a 24-hour gage from the pool's O'Hara lime pay zone at 2,518-43 ft. The flow followed a 6,000-gal. acid treatment of the section. Total depth is 2,595 ft.

The completion closely follows that of the same company's 3 Culver, which flowed 696 bbl. per day with pay at 2,515-36 ft., and Delta Drilling Co.'s 3 Walker heirs, which has flowed as much as 2,955 bbl. in a single day's gage. After 15 days, the latter well has produced 30,143 bbl. and still was making 1,940 bbl. daily.

What appears to be another new productive spot in the Glenville area on the Daviess-McLean County line about a mile north of Glenville and about ½ mile from other production has been found by George & Wrather and associates in their 1 McCann, SE NW SW 18-N-2E. A drill-stem test of O'Hara lime at 1,870-74 ft. resulted in a substantial show of gas and a recovery of 265 ft. of mud-cut oil. Casing has been run to test.

In the South Poole area, Webster County, I. B. Browning 1 Osborn heirs, NW SW SE 13-N-2E, a stepout test, found saturation in



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the Palestine sand at 1,627-40 ft., from which, in a drill-stem test, 270 ft. of gas and 50 ft. of clean oil was recovered.

C. E. Skiles and J. C. Ellis 1 Drury, SE NW SE 18-O-27, ¼ mile south of the West Louisville townsite in Daviess County, and about a mile from production in the St. Raphael Church and Curdsville pools, is being put on the pump after swabbing 5 bbl. of oil per hour in a production test of Waltersburg sand at 1,308-26 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Daviess County: C. E. Skiles and J. C. Ellis 1 Payne, SW NE SE 18-O-27, IP 10 bbl., Tar Springs 1,365-85 ft., TD 1,380 ft. (Discovery well West Louisville pool.)

Henderson County: Kingwood Oil Co. 1 Dunn-Leach, NE NW SE 15-Q-27, IP 143 bbl., Waltersburg 1,191-95 ft., TD 1,196 ft. (Discovery well Reed East pool.)

WESTERN KENTUCKY WILDCAT FAILURE

Union County: George S. Engle 1 McCloud-Luckett, SW NW SE 6-O-19, dry, TD 2,701 ft.

EASTERN KENTUCKY

ASHLAND.—In southern Boyd County and bordering the Lawrence County line, W. S. Perry et al are testing a show of oil at their 1 Phil Preece located in 5-U-82. Berea (Mississippian) sand was topped at 1,758 ft. and carried to a total depth of 1,844 ft. A good showing of oil was had and operators are now planning to shoot. Successful completion would mark the first attempt to open up new production in this old pool in many years.

In Johnson County, 19-R-79, Ashland Oil & Refining Co. continues to be jinxed with drilling troubles at 8 Wallace Williams, deep test for the Laurel Creek Dome of the Paint Creek Uplift. With sand pump lost in the hole, contractor has endeavored to drill up same and is now attempting to drill by. Drilling deeper will then be in order.

On the northwestern edge of the Laurel Creek Dome, Johnson County, Ashland Oil & Refining Co. has recently completed 62 Sanford Lyons for 15 bbl. daily from Weir (Mississippian) sand at a total depth of 939 ft. It marks another completion for the Martha pool.

INDIANA

EVANSVILLE.—C. E. Skiles and associates 2 Ray Woelker, NE SW SW 1-6s-13w located near the center of the shallow Pennsylvanian sand gas-producing area 1½ miles southeast of Oliver and about a mile east of the Bufkin oil pool in Posey County, is giving promise of making an oil well with saturation having been found in both the Mansfield sand and the O'Hara lime.

The O'Hara, which is considered the more promising of the two zones, showed oil at 2,754-59 ft. A drill-stem test of this zone resulted in a recovery of 120 ft. of clean oil and 90 ft. of oil-cut mud. The Mansfield sand, in which showings also were found, is at 1,236-44 ft. In the 5½-in. oil string, which was run to the top of the O'Hara pay, an alley section was placed opposite the shallower zone, which will be tested later. The Pennsylvanian gas-producing zone in the area is found around 600 ft.

In the same county, C. E. Skiles has completed his 2-B Mumford, NE SE NE 33-3s-13w, which opens a new producing spot east of the Mumford pool, and a new pay zone for the area. The well pumped 205 bbl. per day from Waltersburg sand at 1,994-2,010 ft. Production in the Mumford pool is from Cypress sand. The location is 6 miles southeast of Grayville and ½ mile south of the Gibson County line.

INDIANA SUCCESSFUL WILDCATS

Posey County: C. E. Skiles 1 Luigs-Helfrick, SE SW NW 25-5s-12w, IP 4 bbl., Cypress 2,280-86 ft., TD 2,292 ft. (Extension St. Wendell East pool.)

C. E. Skiles 2-B Mumford, NE SE NE 33-3s-13w, IP 205 bbl., Waltersburg 2,000-05 ft., TD 2,007 ft. (New pay and extension Mumford pool.)

Sullivan County: F. B. Cline 1 Bell, NW NW SE 23-8n-10w, IP 800,000 cu. ft. gas, Pennsylvanian sand 771-75 ft., TD 775 ft. (Extension Denny pool.)

INDIANA WILDCAT FAILURE

Gibson County: W. R. Cochran 1 Rembe, NE NW NW 4-2s-9w, dry, TD 1,723 ft. E. F. Moran 1 Schluesser, NE NE NW 28-3s-10w, dry, TD 2,262 ft.

MISSISSIPPI

Two Wildcats Hold Much Attention in Delta Section

JACKSON.—In the Delta section of Mississippi two wildcat tests are claiming much attention with both trys seeking production in the Smackover lime horizon. Sun Oil Co. and C. H. Murphy were drilling below 7,200 ft. in the 1 Lee, 14-15n-7w, Washing County, 4 miles southwest of Hollendale, with no definite geological information released. In Issaquena County, the S. C. Oil Group was drilling at 8,100 ft. in red shale at the 1 Joe Lazarov, 9-11n-8w, approximately 6 miles southwest of Myersville.

The Lazarov is approximately 2 miles southwest of California Co. 1 Alluvial Farms, 34-12n-8w, which was drilled to a depth of 9,234 ft. in 1945. The well was abandoned after extensive testing, although some shows were logged in the Smackover lime.

In the Pickens field, Yazoo and Madison counties, Carter Oil Co. was drilling below 8,900 ft. in the 1 J. L. Wilson, 30-12n-3e. This test is also seeking production in the Smackover lime, and is the first deep test drilled in the Pickens pool.

No information has yet been released on the Humble Oil & Refining Co. D-1 McKittrick, 50-7n-3w, Adams County wildcat. Operators are drilling below 7,800 ft. with rumors that oil shows have been logged in the Wilcox sand section.

Humble's second "tight" wildcat, the 1 Roane Byrnes, 13-5n-3w, northwest of the Armstrong field, was drilling below 9,600 ft.

Operations have been resumed at the George Vasenl Tung Oil Corp., 9-2s-11w, deep wildcat northeast of Wiggins, Stone County. Crews have set a cement plug at 14,200 ft. and are preparing to set whipstock and commence sidetrack drilling. Several months ago diamond-core bit, barrel and three point of tubing became stuck at 14,385 ft. Total depth of the hole is 14,415 ft. with operators proposing to deepen to 16,000 ft.

In Alabama, the R. G. Houser 1 C. B. Morgan, an extension to East Gilbertown field, Choctaw County, has been completed for an initial production of 528 bbl. daily. Test was perforated from 3,308-18 ft. and gravity of oil was 20.7.

MISSISSIPPI WILDCAT FAILURES

Jefferson County: H. Barksdale Brown & Co. B-1 George Armstrong, 35-8n-1w, dry, TD 6,320 ft.

Walthall Count: The California Co. 1 Mrs. Cora L. Collins, 2-3n-11e, dry, TD 10,453 ft.

New L.P.G. Bottling Plant

A new plant for bottling and distributing of liquefied petroleum gas has been opened by Socony-Vacuum Oil Co., Inc., in Burlington, Vt. It will serve Vermont, New Hampshire, and upper New York, an area previously supplied by New Jersey and Maine plants.

ILLINOIS

Activity Spreads Rapidly In Louden Extension Area

MATTOON.—Opened less than 2 months ago, the new extension area east of the Louden pool in Fayette County already has developed into one of the most active spots in the Illinois basin. Four additional producers were completed the past week, one of them, Homer Luttrell 1 Delassus, SW SE SE 34-8n-3e, extends production westward to within ½ mile of the main pool. These make a total of eight wells completed since the play got under way. Fifteen additional wells are in the pay, the Cypress sand, found at a depth of approximately 1,550 ft., and are in various stages of completion. Six wells are drilling in the immediate area with eight additional locations having been made.

Proven production, centering in Sections 2 and 3-7n-3e, now extends a distance of 2½ miles along a northeasterly-southwesterly trend, and is more than a mile wide at its widest point. Wells produce initially at rates of from 40 bbl. to as high as 250 bbl. daily.

A new pay zone, the eighth for the area, is being opened in the Centerville East pool, 5 miles northwest of Crossville, in White County, where Fox & Fox are testing the Palestine sand in their 2-A Barbee-Williams, SE SE NW 18-4s-10e. Saturation was found at 2,220-30 ft., where a drill-stem test gave a recovery of 750 ft. of clean oil and 60 ft. of oil-cut mud with no indication of water. The well is a twin to 2 Barbee-Williams, which has been completed as a 380 bbl. pumper in Cypress sand at 2,854-74 ft. These wells offset twin wells recently completed in the SW SW NE Section 18 which are producing from the Tar Springs and Aux Vases sands.

ILLINOIS WILDCAT FAILURES

Christian County: A. F. Briggs 1 Wharton, NW NW SW 27-11n-4w, dry, TD 2,048 ft.

Rinehart & Fruehauf 1 Trumbauer, NE SW SE 32-15n-2w, dry, TD 1,972 ft.

W. W. Toler 1 J. O'Brian, SE SE SW 24-13n-3w, dry, TD 1,598 ft.

Franklin County: J. W. Rudy 1 Burr Oak, NW NE NE 34-5s-1e, dry, TD 2,916 ft.

Fulton County: B. J. Grigsby 1 Elsbert, SW SW SW 23-6n-1e (4th P.M.), dry, TD 1,400 ft.

Piatt County: National Associated Petroleum Co. and Continental Oil Co. 1 Matthews, NW NE NE 15-16n-6e, dry, TD 2,591 ft.

Pike County: Orville Carls 1 Mountain, SE NE SW 4-3s-4w, dry, TD 558 ft.

Shelby County: F. A. Bridge 1 Hennish, NE NE SE 3-11n-4e, dry, TD 1,885 ft.

T. Meyers 1 Adams, SE SW SW 28-11n-3e, dry, TD 1,885 ft.

Washington County: Jones & Simpson 1 Thompson, SE NE NE 7-2s-2w, dry, TD 1,601 ft.

F. L. Strickland 1 Thompson, NW SE NW 4-2s-1w, dry, TD 1,800 ft.

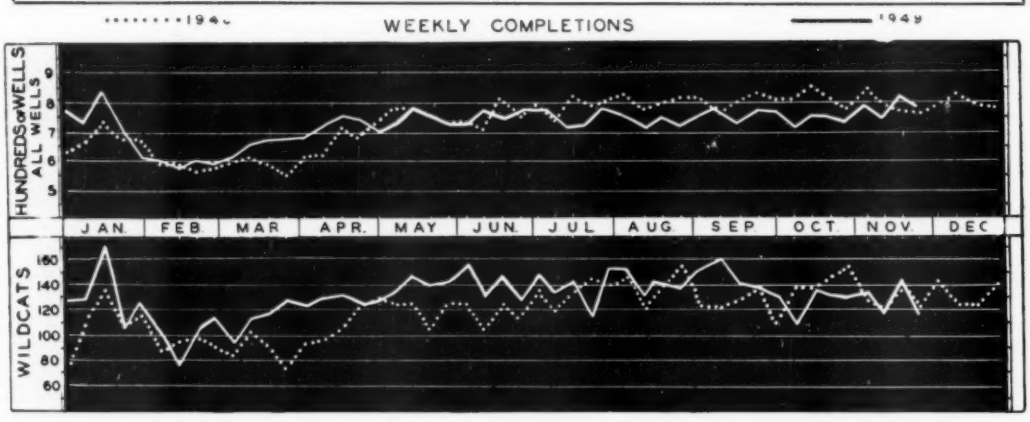
New Gas Outlet Provided

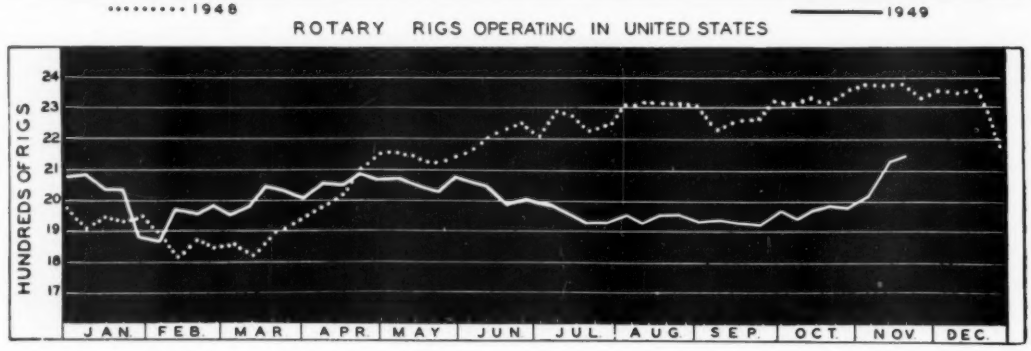
Oklahoma Natural Gas Co. is providing an increased natural-gas outlet from the Bartlesville sand zone in West Edmond field of Oklahoma, with a 10-in. line and installation of a dehydration plant to facilitate transmission from the north end of the producing area. Projected to start soon is the laying of 25 miles of 10-in. from the Guthrie area to Stillwater. Oklahoma Natural's system in the Stillwater - Pawnee - Cushing area previously has depended on local gas production for market supply.

WEEKLY WELL COMPLETIONS . . WEEK ENDED NOVEMBER 26, 1949

	Total of all wells					Nov. 26		Wildcat completions and discoveries					Cumulative total, 1949				
	Comp.	Oil	Gas	Dry	Footage	1949	1948	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	†11	5	†1	*5	15,931	680	1,221	0	0	†1	0	†1	0	0	1	0	1
Pennsylvania	22	8	5	‡9	40,420	1,709	2,660	0	0	0	1	1	0	0	4	2	6
West Virginia	9	4	4	1	25,163	467	768	0	0	0	0	0	1	0	12	11	24
Ohio	25	10	6	‡9	58,255	987	1,220	0	0	0	0	0	2	0	2	29	33
Indiana	23	10	1	12	42,342	1,179	961	2	0	1	2	5	33	0	4	211	248
Kentucky	22	12	2	8	44,402	924	813	2	0	0	1	3	27	0	0	71	98
Illinois	60	25	0	35	126,130	2,465	2,151	0	0	0	11	11	61	0	2	432	495
Michigan	10	3	0	7	28,483	915	753	0	0	0	4	4	26	0	3	279	308
Kansas	85	36	13	§36	267,682	2,971	2,839	1	0	0	9	10	69	0	9	368	446
Neb., Mo., Iowa	0	0	0	0	0	29	55	0	0	0	0	0	2	0	0	17	19
Oklahoma	96	57	8	§31	316,739	3,890	3,747	2	0	0	11	13	131	13	16	554	714
Texas	267	177	16	74	1,092,787	11,851	10,733	7	0	0	37	44	362	40	107	2,025	2,534
North Central (Dist. 7-B & 9)	81	49	2	30	253,083	3,961	3,336	5	0	0	14	19	163	0	19	806	988
West (Dist. 7-C & 8)	80	70	0	§10	394,380	2,907	2,871	1	0	0	5	6	57	1	6	242	306
Panhandle (Dist. 10)	26	17	9	0	78,786	874	586	0	0	0	0	0	1	0	1	9	11
Eastern (Dist. 5, 6, & 6-P)	14	10	0	4	65,883	703	531	0	0	0	1	1	11	4	3	140	158
Gulf Coast (Dist. 2 & 3)	31	14	3	14	160,121	1,729	1,637	1	0	0	7	8	72	28	44	337	481
Southwest (Dist. 1 & 4)	35	17	2	16	140,534	1,677	1,712	0	0	0	10	10	58	7	34	491	590
Louisiana	52	33	3	16	296,673	2,063	2,078	2	0	0	5	7	52	18	4	186	260
Northern	36	19	3	14	138,468	1,240	1,398	0	0	0	5	5	5	2	0	90	97
Southern	16	14	0	2	158,205	823	680	2	0	0	0	2	47	16	4	96	163
Arkansas	11	9	0	2	34,559	294	263	0	0	0	1	1	3	0	1	63	67
Mississippi	2	0	0	2	16,773	304	373	0	0	0	2	2	5	2	1	95	103
Southeastern States	0	0	0	0	0	42	42	0	0	0	0	0	1	0	0	34	35
Montana	1	0	0	1	4,649	263	292	0	0	0	0	0	4	0	2	31	37
Wyoming	14	11	0	3	74,469	541	510	1	0	0	2	3	23	0	1	105	129
Colorado-Utah	2	0	0	2	11,175	125	198	0	0	0	2	2	2	0	0	63	65
New Mexico	10	9	1	0	48,456	454	537	0	0	0	0	0	13	1	2	47	63
California	52	39	1	12	196,235	2,364	2,547	0	0	0	7	7	35	0	7	411	453
Dakotas	2	0	0	2	11,658	18	2	0	0	0	2	2	0	0	0	15	15
Total United States	776	448	61	267	2,752,981	34,535	34,763	17	0	2	97	116	852	74	178	5,049	6,153
Total previous week	824	451	59	314	2,811,429			18	0	8	118	144	835	74	176	4,952	6,037
Total November 27, 1948	767	439	48	280	2,650,313			15	1	7	98	121	796	68	225	4,596	5,685

Service wells included: *5, ‡8, †2, §1. †Incl. 1 Maryland at 4,910 ft.





DAILY AVERAGE PRODUCTION FOR WEEK

	Nov. 26 crude oil	B. of M. Nov. demand	Nov. 19 crude oil
Alabama	1,350	1,200	1,350
Arkansas	73,900	85,000	73,750
California	867,900	850,000	869,000
Colorado	66,400	73,000	64,800
Eastern	57,700	60,900	58,500
Florida	975	1,000	1,075
Illinois	182,200	185,000	178,700
Indiana	29,100	29,000	28,600
Kansas	290,150	302,000	295,300
Kentucky	24,900	23,000	25,100
Louisiana	530,000	530,000	529,750
North Louisiana	118,600	.....	118,350
South Louisiana	411,400	.....	411,400
Michigan	46,900	45,000	43,300
Mississippi	97,250	108,000	96,500
Montana	26,200	25,000	26,000
Nebraska	1,150	700	1,200
New Mexico	132,900	138,000	132,900
Oklahoma	426,500	415,000	428,600
Texas	2,169,425	2,230,000	2,169,425
Dist. 1 (Southwest)	27,300	.....	27,300
Dist. 2 (Southwest)	132,425	.....	132,425
Dist. 4 (Southwest)	204,200	.....	204,200
Dist. 3 (Gulf Coast)	400,925	.....	400,925
Dist. 5 (Eastern)	37,575	.....	37,575
Dist. 6 (Eastern)	92,950	.....	92,950
East Texas field	273,300	.....	273,300
Dist. 7-C (West)	55,325	.....	55,325
Dist. 8 (West)	645,975	.....	645,975
Dist. 7-B (W. Central)	63,150	.....	63,150
Dist. 9 (N. Central)	144,000	.....	144,000
Dist. 10 (Panhandle)	92,300	.....	92,300
Utah	3,300	1,200	3,350
Wyoming	135,900	127,000	134,500
Total United States	*5,164,100	5,230,000	5,161,700
Change from previous week, up	2,400		

Total production January 1-November 26 †1,675,393,080 bbl.
Same period last year (crude plus cond.) 1,824,565,070 bbl.

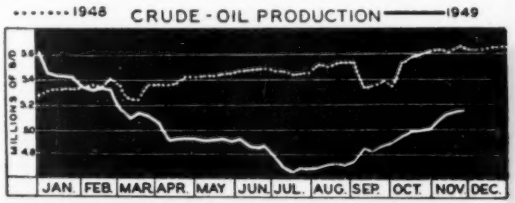
*Not including 82,030 bbl. condensate. †Including 27,119,670 bbl. condensate.

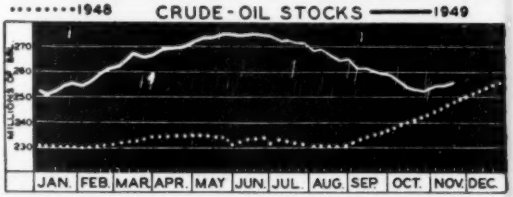
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

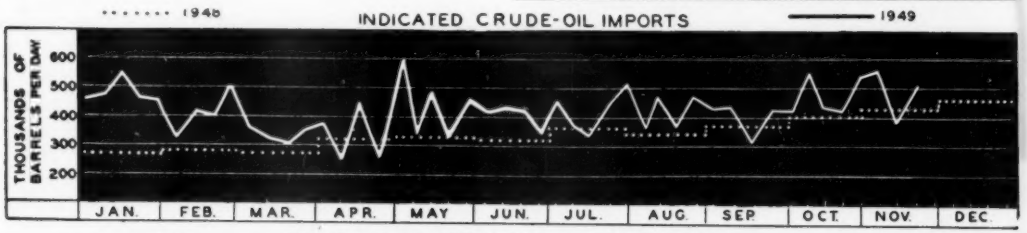
(Thousands of barrels)

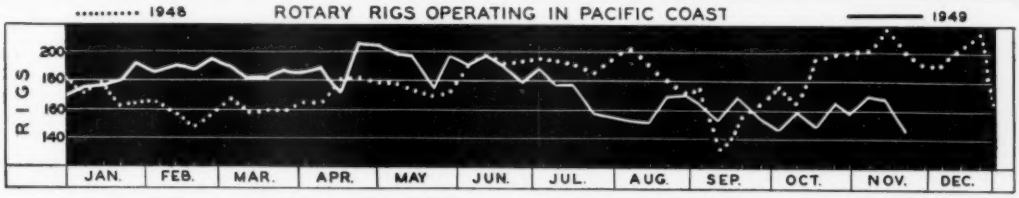
	Nov. 19, 1949	Nov. 12 1949	Nov. 20, 1948
Pennsylvania Grade	3,150	3,147	2,972
Other Appalachian	2,249	1,952	1,326
Illinois, Indiana, Michigan	11,184	11,793	11,917
Arkansas	2,687	2,575	3,306
Louisiana	13,162	13,453	11,519
North	2,913	3,471	2,823
Gulf	10,249	9,982	8,696
Mississippi	2,350	2,468	2,959
New Mexico	7,476	7,444	6,186
Oklahoma and Kansas	37,065	36,491	36,431
Texas	117,365	115,640	114,245
East Texas	17,061	16,249	15,724
West Texas	44,526	44,380	42,643
Texas Gulf	30,038	29,938	30,178
Other Texas	25,740	25,073	25,700
Rocky Mountain	13,976	13,902	11,452
California	37,653	37,836	35,030
Foreign	8,057	7,610	6,094
Total United States	256,374	254,311	243,637

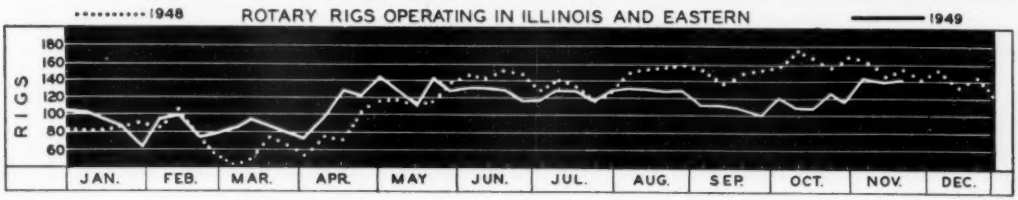
*Bureau of Mines.











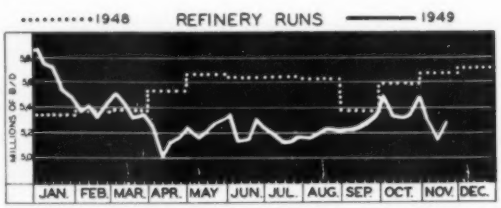
Refining Statistics

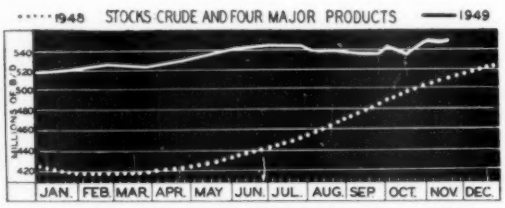
A.P.I. REFINERY REPORT, NOVEMBER 19

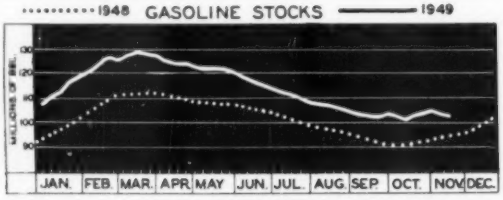
(Thousands of barrels)

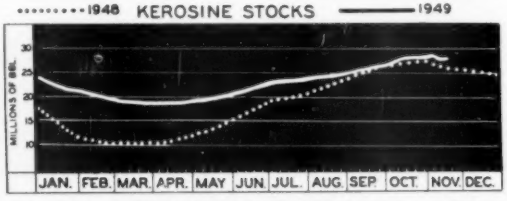
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at Refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, November 1948: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	735	310.4	28.4	189.6	192.7	22,851	11,816	31,102	10,420	865	303.8	43.6	177.5	220.7
Appalachian:														
District 1	99	46.1	8.3	11.4	9.1	2,705	418	931	497	101	43.3	7.6	12.5	13.5
District 2	60	30.7	3.0	4.3	14.0	1,353	137	234	198	71	35.5	3.4	10.4	15.9
Ind., Ill., Ky.	937	489.9	58.7	142.8	155.1	21,535	5,550	14,199	4,476	967	486.9	67.2	141.7	151.7
Okla., Kans., Mo.	424	237.2	21.3	79.7	64.6	9,424	1,570	6,331	1,816	437	241.2	22.0	84.1	75.2
Inland Texas	209	144.3	10.1	24.9	42.9	3,989	853	1,031	1,459	240	157.6	16.5	22.4	59.1
Texas Gulf Coast	1,292	616.4	83.6	286.7	234.2	14,235	3,506	15,812	7,881	1,387	622.6	117.4	338.5	244.1
La. Gulf Coast	448	239.2	55.1	96.4	65.0	5,869	1,838	5,137	2,793	451	190.0	58.2	99.5	74.7
N. La. and Ark.	79	31.1	7.6	9.3	14.1	2,171	487	856	347	85	32.5	8.8	12.7	19.0
Rocky Mountain:														
New Mexico	11	6.3		1.6	2.6	80	50	96	31	13	6.4	0.3	1.8	3.9
Other Rocky Mtn.	170	75.4	8.0	27.4	44.1	2,476	374	2,026	615	151	69.6	3.6	28.9	38.1
California	828	366.9	34.0	142.6	335.0	16,892	928	14,897	38,087	961	361.9	13.0	140.8	375.6
November 19, 1949	5,292	2,593.9	318.1	1,016.7	1,173.4	103,380	27,526	92,652	68,620	5,729	2,551.3	361.6	1,070.8	1,291.5
November 12, 1949	5,127	2,526.6	298.8	978.4	1,116.3	103,577	27,622	92,117	68,527					
November 20, 1948	5,733	2,543.1	353.1	1,071.9	1,317.7	91,244	26,793	79,690	62,833					

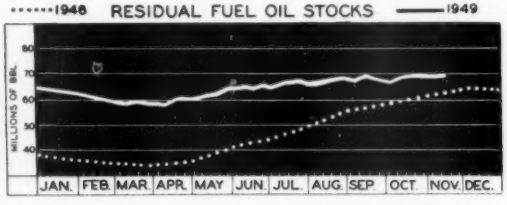
*At refineries including natural blended. †Finished and unfinished.

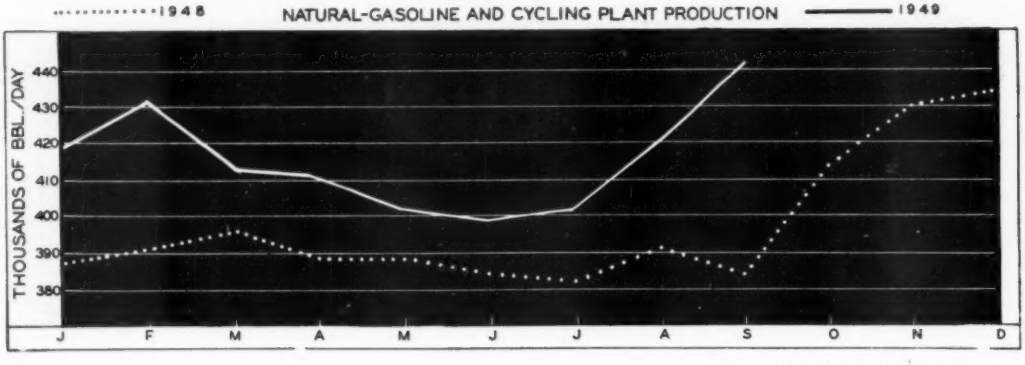












CRUDE PRICES GRAVITY SCHEDULE

Gravity—	Calif. Hill, Signal	Kansas homa, Okla-	Tex.* Coast Gulf	Tex.† West
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.13
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.40
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°, †35° and above.

RECOGNITION was given to the weakness of the gasoline market as Esso Standard Oil Co. announced a reduction in Gulf Coast cargo prices amounting to .25 cent per gallon. The new posting, effective November 25, brought the prices of regular and premium down to 9.75 cents and 10.75 cents per gallon respectively. Esso also announced reductions throughout the company's marketing territory ranging from .2 cent to .6 cent per gallon at all levels of distribution and in all areas except those where downward adjustments had been made previously.

Heavy-fuel markets in the Gulf-East Coast districts are shifting toward the firm side again after sluggish weeks resulting from California-East Coast shipments and the effects of the steel strike.

Good low-sulfur residual fuel is scarce in Mid-Continent spot markets. Some suppliers are predicting better prices for heavy fuel in the near future. During the summer and early fall residual stocks were held down by sales that brought a very low netback to the refiner. Some moved to the Gulf for shipment to the East Coast and some moved by rail to the Mississippi River and thence by barge to the industrial areas along the Ohio River.

Colder weather just before Thanksgiving resulted in a colder week than the same period last year but the season to date is still warmer than a year ago. Distillate stocks increased another half million barrels in the week ended November 19 with most of the gain east of California. Some suppliers predict that it will take more than one or two cold days to clear up distress material in Gulf-East Coast markets.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of November 28, 1949. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9½-10	10.625-11.2	9½-9¾
Premium gasoline, 78-80 octane	10⅜-11	12-12.2	10½-10¾
42-44 w.w. kerosine	7¾-8¼	8.3-8.9	7½-8
No. 2 straw fuel oil	6¾-7	7.75-8.5	7-7¼
No. 6 residual	$0.90-1.00	$1.95-2.05	$1.60-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅞	5⅜	5⅛
Grade 18-55	7.1	6.5	6.8

LUBRICATING OILS SOUTH TEXAS

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS Mid-Continent

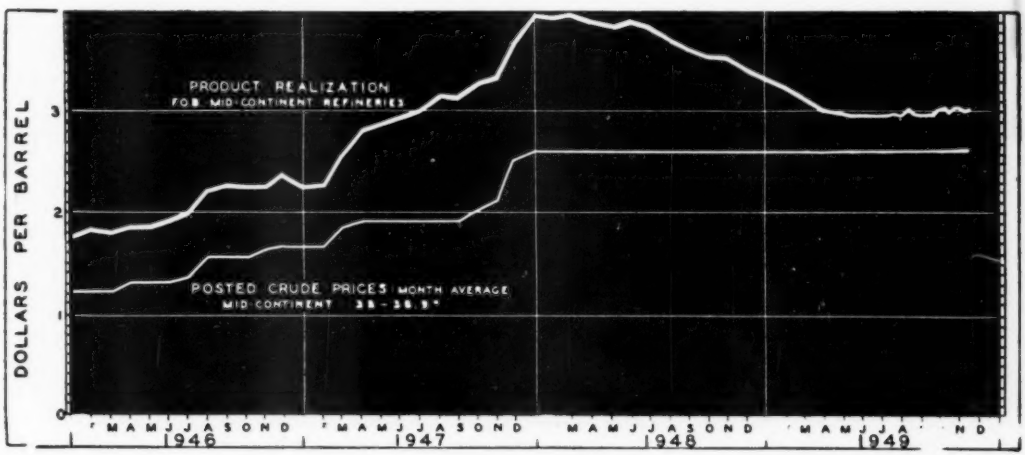
150-160 vis., D bright stock, 0-10 pp.	17-19
200 vis., No. 3 neutral, 0-10 pp.	11.5-14

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX Mid-Continent

132-134 A.M.P.	4.25



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

The shortest distance to quality steel pipe

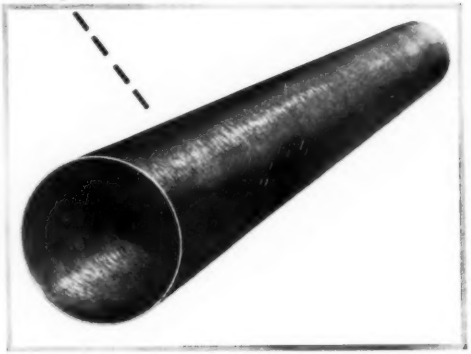
. . . is actually a long distance!

For the production of *quality* steel line pipe demands absolute control at every step: Starting with the mining of coal and iron ore, and going through blast furnaces, open hearths and rolling mills until steel plate emerges as finished pipe.

At Kaiser Steel *all* these facilities and sources of supply are completely integrated.

Every plate of steel, every length of pipe, is checked and rechecked. By the time Kaiser Steel line pipe is ready for you, it has been put through 52 analyses, tests and inspections to make sure it meets precise specifications on every count!

Diameters up to 30 inches. Kaiser Steel line pipe to latest API specifications—in diameters up to 30 inches, and in lengths up to 40 feet—is now available from Kaiser Steel. Shipping points are Fontana and Napa, California.



It's good business to do business with

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

	Type	Diameter	Length	Wall Thickness	Shipping Point
Prompt deliveries on the following:	Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
	Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
	Electric Resistance Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Now on order—delivery 1st quarter, 1950	Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
	Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION, Los Angeles, Oakland, Seattle, New York

EQUIPMENT MEN . . . in the News

Martin-Decker Appoints Reed Canadian Distributor

E. L. DECKER

In order to expand service and distribution facilities to meet the growing needs of the oil industry, Martin - Decker Corp., Long Beach, Calif., has appointed Reed Roller Bit Co. as its Canadian distributor.

Under this new arrangement Reed is providing complete field service, including instrument pickup and delivery to service headquarters, qualified repair and service facilities, and maintaining adequate stocks of instruments and spares.

According to E. L. Decker, Reed's service facilities have been augmented by Martin-Decker direct factory representatives, and Martin-Decker's policy of selling through recognized supply houses has been extended to Canada.

Midwest Engine Appoints Export Representatives

Midwestern Engine & Equipment Co., Tulsa, has announced that it has appointed as its exclusive export representative, International Oil Equipment Co., Inc., located in New York City at Rockefeller Plaza. Midwestern distributes several exclusive lines of pipe-line and oil-field equipment.

Among those products which will be distributed on a world-wide basis through International Oil Equipment Co. are: Owens-Corning Coromat Pipe Wrap, Glasfab, Kapco Rock Shield, and the Beacon Light Plant, a new addition to the Midwestern distribution line.

American Manganese Names Bruton Manager

William C. Bruton has been appointed district sales manager for American Manganese Steel Division of American Brake Shoe Co., and Robert H. Elem has been appointed Pacific Coast manager of the welding products department, according to an announcement by J. B. Terbell, division executive vice president.

Bruton, formerly sales engineer, first joined Brake Shoe in 1916. His territory covers the Pacific Northwest including Yukon territory and Alaska, and he will make his headquarters at Oakland, Calif. Elem, formerly welding engineer, is a graduate of University of Southern California. He will make his headquarters at the plant in Los Angeles.

Indian Drilling Mud Co. Established Warehouses

Indian Drilling Mud Co., Britton, Okla., has announced the establishment of two new warehouse points. New buildings have been erected at Ringwood, Okla., and Snyder, Tex., to warehouse Indian products. Darrel Clawson is the district engineer for Indian at Ringwood and Jerry Cooper is the district engineer at Snyder.

Falcon Names Distributors For New Safety Valve

Greenwood and safety valve

Dolph H. Greenwood, sales engineer for Falcon Products, Inc., Pomona, Calif., is pictured with a plastic model of the new Falcon-Greenwood triple-action safety quick-closing valve introduced nationally as a safeguard against plant and refinery fires.

R. J. Eiche & Associates, New York City, was appointed export and Eastern Seaboard representative for Falcon-Greenwood valves and M. N. Aitken & Co., Houston, was appointed distributor for the Gulf Coast. Greenwood's itinerary included showing of the new valve in every active oil and refining section in the Eastern states, Mid-Continent, and Rocky Mountain areas.

Fairbanks-Morse Makes Gobble Dallas Manager

H. D. GOBBLE

Harold D. Gobble, formerly manager of the oil-field division of Fairbanks, Morse & Co., has been appointed manager of the Dallas branch house, according to a recent announcement. He succeeds Harry J. Renken, who has been transferred to the company's headquarters in Chicago to become oil-field division manager.

Gobble joined the company in 1927 as an office assistant of the diesel department of the St. Louis branch. In 1929 he became a diesel field engineer and later took over the company's oil-field activities in the Fort Worth and Dallas areas. In 1944 he was transferred to the Chicago headquarters office as manager of the oil-field division, which position he occupied until his latest appointment. He is a graduate of Washington University, St. Louis.

Parker Made Vice President Of Timken-Detroit Axle

F. W. PARKER, JR.

The board of directors of Timken-Detroit Axle Co. has elected Fred W. Parker, Jr., a vice president of the company, it has been announced by Walter F. Rockwell, president.

Parker, who is an engineering graduate of Cornell University, has been associated with Timken-Detroit since 1927. During that time he served in the engineering, sales, and service departments of the company. For the past 2 years he has been assistant to the president.

Bovaird Has Gilmer Products for Oil Fields

Bovaird Supply Co., pioneer in oil-country supply-store service, has been designated distributor for L. H. Gilmer Co., of Tacony, Philadelphia, a division of United States Rubber

Co. The Gilmer line includes V-belts, V-belt sheaves, rubber and friction tape. The Gilmer products distributed by Bovaird's distributorship includes the territory covered by its stores in Illinois, Kansas, Oklahoma, and Texas.

Griffiths Made Unistrut Assistant Sales Manager

Spencer R. Griffiths has been appointed sales manager of Unistrut Products Co., Chicago, according to J. P. Heslin, Unistrut sales head. Griffiths was formerly associated with Joseph T. Ryerson & Son, Inc., in charge of stainless-steel sales in the Midwest district.

Belfield Valve Adding Four to Selling Staff

Belfield Valve division of Minneapolis-Honeywell Regulator Co., is adding to its field sales staff in a new and expanded sales and manufacturing program. This program, according to W. H. Steinkamp, field sales manager, will cover the entire country and its efforts will be directed to all types of manufacturing and processing industries.

Those assigned to full time on regional valve sales are: Russell A. Schlegel for the eastern region, with headquarters in New York; George Brown for the central region, with headquarters in Cleveland; Robert Scott in the midwest and northwest regions, with headquarters in Chicago, and William Clements in the Pacific, north coast, and mountain regions, with headquarters in Los Angeles. All of these new appointees were formerly members of the field sales staff of Brown Instruments division of the Honeywell organization.

Houston Appointed Vice President of Hart & Burns

EARL HUSTON, JR.

Appointment of Earl "Tex" Huston, Jr., as vice president in charge of sales and advertising for Hart & Burns has been announced by L. A. Hart, president of the paint and plastic - surface manufacturing organization.

Hart & Burns has recently introduced a line of plastic-surface coverings developed by Arthur E. Burns, young scientist who received the Distinguished Service Award from the Secretary of Navy for his discovery of the antifouling marine paints that played an important part in the war. These products include Catha-Coat, Gun-Tex, Durahart, and Navicote.

Edgar Becomes General Manager of Hunt-Spiller

A. J. EDGAR

Alonzo J. Edgar has been appointed general manager of Hunt-Spiller Manufacturing Co., Boston, it has been announced by N. C. Raymond, president. Edgar was graduated in mechanical engineering and metallurgy from Michigan State College.

Upon graduation, he went to work as a foundry laborer in the Saginaw Malleable Iron Division of General Motors Corp. He then joined Steel Sales Corp. to work with nonferrous foundries in the Chicago area in the development of nickel and nickel alloys uses.

Edgar comes to Hunt-Spiller from Benton Harbor Malleable Iron Co., where he has been employed as works manager since 1946.

Arnall Appointed General Manager of Lunkenheimer

P. M. ARNALL

Lunkenheimer Co., manufacturers of valves and engineering appliances, has announced the appointment of Paul M. Arnall as vice president and general manager. This action results from a decision of the board of directors and the management to divide the functions of president and general manager into two separate functions, in order to provide for a better distribution of the top-management administrative responsibility.

Arnall will assume his new position January 3. He was educated at University of Kansas and has had wide experience in the industrial field. With Graton & Knight Co., he rose to assistant general sales manager. He then became associated with Ohio Injector Co., as sales manager and for the past several years has been executive vice president and director.

After January 3, Lunkenheimer management organization will consist of Frank P. Rhame, president; Paul M. Arnall, vice president and general manager; Homer E. Lunken, vice president and assistant general manager; Harry A. Burdorf, vice president, sales; Edmund P. Lunken, vice president; Chester C. Isekeit, treasurer; and Charles W. Burrage, secretary.

Nelson Electric Moves to New, Modern Building

Latest ideas in building construction designed to produce the fastest, most economical service possible has been achieved by Nelson Electric Supply Co., as the firm moves to its new two-story warehouse and office building at 526 North Main Street, Tulsa.

Sales and service operations were carefully considered in the designer's interior plans, resulting in the adoption of features including the new type of ramp floor that eliminates elevators and stairs. There is also ample dock space and parking space.

Nelson Electric Supply has been serving industry for over 22 years, specializing in electrical equipment and supplies for the oil industry. It has grown from a staff of 6 employes in 1926 to more than 30 at the present time.

Reintjes Co. Names Two Refractories Distributors

Geo. P. Reintjes Co., arch and wall manufacturer, Kansas City, Mo., has announced the appointments of Charles T. Snow, New Orleans, and Interstate Sales, Inc., as representatives.

Snow, who is well acquainted with processing industries throughout the South, will represent the company in the states of Louisiana, Florida, lower Mississippi, the southern part of Alabama.

Frank Weyforth, president of Interstate, which will represent Reintjes in the St. Louis area, has had many years of experience in the sale of refractories, especially to oil refineries and industrial power plants.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED

All ads, 12 cents a word. Minimum charge, $3.00 per insertion.
Centered Line, any ad, $1.00.
Box Numbers count 9 words when replies are to be sent to our Tulsa Office. Replies forwarded without charge.

DISPLAYED, PER INCH

$12.00 per column inch per insertion. One-point border and 12-point capitals are allowed. Larger type sizes not accepted.

All classified advertising payable in advance.
10% Discount if 3 insertions are ordered at one time.
COPY DEADLINE, 9:00 a.m. Monday prior to each week's issue.

THE OIL AND GAS JOURNAL
P. O. Box 1260, TULSA, OKLAHOMA

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GENERATORS for diesel driven electric power, 125 KVA, 240/280 volt, 3 phase, 60 cycle, 900 RPM, complete with exciters and control cabinets, connections for parallel operation of two or more generators, brand new, manufactured by Electric Machinery Manufacturing Company. $2000.00 each, seven available Northern Ordnance, Incorporated, Minneapolis, Minnesota.

FOR SALE

12—230 H.P. Type 10 Bessemer New 17" Power Cylinders complete ready to run with 16" to 18" Compressors. 1—230 H.P. Clark Horizontal with Compressors. Located Salem, Illinois.

ENGLE PETROLEUM, Incorporated
Box 655, Evansville, Indiana

New U.S. Pressure Gauges

Fig. 539, 0-100# gauge illustrated, has two hands operating from two separate mechanisms for one or two gauging operations at the same time.

Government cost	**$30.00**
Our cost	**$ 4.50**

10% discount in doz. lots; other discounts on larger quantities.

Write for illustrated catalog describing 1000's of Ashcroft, U.S., Marsh and other popular makes, pressures and sizes.

All gauges are shipped subject to your trial and acceptance and are brand new in original factory carton.

All prices FOB Tulsa.

T. & T. TOOL CO.
101 West Archer Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

New Wire Rope at Money-Saving Values: Leading brands. Sizes ¼" to 1¼", 6x19, 6x37, construction for all purposes. Degen Pipe & Supply Company, Box 107, Red Fork Station, Tulsa, Oklahoma.

ONE H. D. Failing 1500 Mtd. on New G.M.C. Drill pipe, tools, and accessories. Very cheap. F. K. Kelley, Ph. 54-9764, 208 N.W. 36th Street, Oklahoma City, Oklahoma.

150 HP. Murray Water Tube Boiler complete with burner, forced draft fan with motor, and automatic controls. Good condition. Boiler now in service. Neuhoff Bros. Packers, Dallas, Texas.

ONE complete power rotary rig, suitable for drilling to 10,000 ft., will sell at a bargain. As a complete rig or by units. F. D. Bridges, Phone 3-7810, 1109 Euclid, Oklahoma City, Oklahoma.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

PIPE FOR SALE

Several thousand feet of each of the following sizes of good used pipe:

2"—good threads and long collars.
3½" O.D.—heavy boiler flue.
4½" O.D.—8-pound gas line.
6" O.D.—10.22 line pipe.
6" O.D.—14-pound high pressure pipe.

All in excellent condition and ready to use.

THE ALLEN GAS CORPORATION
Paola, Kansas

NEW PIPE FOR SALE

(Subject to Prior Sale)

5000 Ft. 9⅝", 36#, J55, Range 2, 8 Rd. Thrd. Seamless Casing
4000 Ft. 8⅝", 28# Ditto
19,000 Ft. 6" Std. Byars L.W. W.I. Pipe

Specification ASTM-AF2-33

Contact

National Cooperative Refinery Assn.
Phone 820 McPherson, Kansas

EQUIPMENT FOR SALE

NATIONAL "50" Compound Double Drum Rig 126' Cantilever Ideco Mast, 10' substructure, 6,000' 4½" drill pipe, this rig complete and in excellent condition. P.O. Box 206, Sta. B, Bakersfield, California.

ORIGINAL Askania tre-compensated vertical magnetometer 10 gammas scale division. Perfect shape and conditions. $2,500.00. Box D-222, The Oil and Gas Journal, Tulsa, Oklahoma.

ROLAGRIP COUPLINGS—For Sale, 100 tons, 1½" to 8" inclusive. New, never used, complete with bolts and neoprene gaskets. Price 50% less than manufacturers selling price. Send for list. JULIUS M. FOGELMAN, Reading, Pa.

FOR SALE

Two 1440 HP GM 16-278A Diesel Engines and two GM 3-268A Diesel Engines—Westinghouse 100 KW AC Generator Sets. Complete with all Aux. Equip. Practically new. Inspect. Make offer. Box D-284, The Oil and Gas Journal, Tulsa, Oklahoma.

100,000 BTU PORTABLE
HEATER and DRYER

Stewart Warner portable, powerful 100,000 BTU gasoline burning Heaters, with Turbine type blowers; 1½ hp air-cooled, ball-bearing engine; 3 ducts (45 ft. total) IMMEDIATE DELIVERY

SALE PRICE $195.00

Excellent Operating Condition Guaranteed

HEATING doghouse, derrick working floor, drill water & mud, bldgs., sheds, warehouses, manholes, tunnels, bldgs. under construction, spot-heating, etc.

DRYING plaster, paint, mortar, concrete.

PRE-HEATING engines, tractors, trucks, equipment, etc.

THAWING frozen areas, machinery, pipelines, tanks, etc.

- VAST QUANTITY OF REPLACEMENT PARTS
- Also SERVICE MANUAL & PARTS CATALOG

PHONE COLLECT—your Heater can be shipped within 2 hours, or, SEND FOR LITERATURE.

BERNSTEIN BROS.
MACHINERY CORPORATION
Phone 8404 • "Since 1890" • PUEBLO, COLO.

7,000' CAPACITY ROTARY RIG

Wilson "Giant" Drawworks Serial 6464, powered by Two 8-cylinder LeRoi Engines; 123' Moorco Portable Mast with 4'-6" Substructure; B-14 Emsco Pump; SS-250 Ideco Swivel; Regan Traveling Block; 27½" Oil Well Rotary; 100 B-J Triplex Hook; 6,500' Excellent 4½" Drill Pipe. This rig is a splendid value. See it at our Oklahoma City yard.

LUCEY PRODUCTS CORPORATION
624 S. Cheyenne TULSA, OKLA. Phone: LD 204

EQUIPMENT FOR SALE

50,000′ of 3½″ OD 14 Gauge plain end, 20-24 ft. joints J & L 800# test pressure tubing immediate delivery. Dale W. Moore, 504 City Natl. Bk. Bldg., Houston, Texas.

FOR SALE: Approximately 25 miles 4″ OD plain end pipe in line. Public Service Corp. of Texas, 902 Burk Burnett Bldg., Fort Worth, Texas.

DON'T ANSWER THIS AD
Unless you really need this
BRAND NEW LINE PIPE

175,000′—6⅝″ O.D.—17.02#—P.E. Bev. —E.W.
12,000′—6⅝″ O.D.—18.97#—P.E. Bev. —S.S.
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70,000′—12¾″ O.D.—41.51#—P.E. Bev. —S.S.
15,000′—12¾″ O.D.—49.56#—P.E. Bev. —S.S.

All items FOB Texas point

Box D-294, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: One 6-DT-317 and one 4-DC-645 Buda Diesel Engine. New engines at 25% off factory list. R. A. Young & Son, Inc., Fort Smith, Arkansas.

FOR SALE: Two Fairbanks-Morse Diesel Engines, 150 H.P. Twin Cylinder, Horizontal Type. Completely overhauled. $1500.00 each. Melton Supply Co., Seminole, Okla.

BARGAIN

Two **new** Model 6NKU-6NK-20-S "Waukesha" Oilfield Power Units. Latest type—7″ x 8½″, 225 h.p., equipped with Twin Disc power takeoff, gas pressure gauge, safety magneto, 1 CKU starting unit, radiator cooled. Can be used with butane, natural gas, or gasoline.

Cost $6799 each; will sell for $5835 each, f.ob. Cut Bank, Montana.

Central Machinery Co.

Your "Caterpillar" Distributor

Great Falls, Montana

EQUIPMENT FOR SALE

FOR SALE

3 WAK Waukesha motors in good condition. Complete with butane equipment and skids. May be seen at our Odessa Yard.

DONNELL DRILLING COMPANY

O'Michael Bldg., Odessa, Tex.

PACKAGED H_2S REMOVAL UNITS

We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.

GRAFF ENGINEERING & EQ'PT. CO.
3415 Westminster, Dallas 5, Texas

NEW STEAM TURBINES

1—150HP Terry, 2970 RPM
1— 55HP Terry, 2970 RPM
1— 50HP G. E., 2960 RPM
1— 24HP G. E., 1480 RPM
1— 24HP Terry, 1480 RPM
1— 20HP Terry, 2960 RPM
1— 15HP Terry, 2930 RPM
1— 15HP G. E., 2930 RPM
1— 9HP G. E., 2960 RPM
1— 9HP Terry, 2960 RPM
1— 5HP Terry, 2880 RPM
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Steam Pressure 150#
Exhaust Pressure 25#
Superheat 0-50° F.

Priced to Sell

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FOR SALE OR LEASE: Portable drilling rig mounted on KR 11 International with Gardner-Denver pump. Derrick raises hydraulically. Hughes core barrel, 1949 GMC 6 wheel tractor and trailer, panel truck, light plant, water pump and approx. $10,000.00 worth of misc. equipment, will drill to 2,900 ft. A REAL BARGAIN.

We can drill at low cost. We would like to quote on your drilling requirements down to 2,800 ft. We would take an interest in well for part payment.

Inspection at Seguin, Texas

RIDDLE OIL CO.

59 East Van Buren St., Chicago 5, Illinois

Telephone: Harrison 7-7875

WATCH THIS SPACE FOR OUTSTANDING WEEKLY VALUES

TOWERS & VESSELS

All API-ASME Code

4—3′x12′x7/16″ thick shell and heads, 260 # w.p.
1—5′6″x13′x3/4″ thick shell and heads, 275 # w.p.
1—5′x13′x3/4″ thick shell and heads, 305 # w.p.
4—4′6″x20′x7/16″ thick shell and heads, 150 # w.p.
2—36″x8′ wi 14″ skirt, 275 # w.p.
1—3′6″x72′x7/16″x9/16″ shell x 7/16″ top head x 9/16″ bottom head, 25 tray absorber, 160 # w.p. @ 150° F. mounted on 10′4″ skirt.
1—4′x68′x1/2″ thick shell and head, 30 tray stripper, 150 # w.p. @ 500° F. radiographed, mounted on 14′6″ skirt.
1—5′6″x70′x1″ thick shell and heads, 30 trays depropanizer, 350 # w.p. @ 300° F. stress relieved and radiographed, mounted on 5′ skirt.
1—3′6″x16′x3/8″ thick shell and heads, reflux accumulator.
1—7′x30′x9/16″ thick shell and heads, 170 # w.p.
1—5′x16′x15/16″ thick shell and heads, 400 # w.p.
1—7′x30′x3/8″ thick shell and heads, 180 # w.p.
1—5′x16′x1/2″ thick shell and heads, 150 # w.p. stress relieved and radiographed.
3—24″x4′x1/4″ thick shell and heads, 50 # w.p.
1—20x″4′11/16″x3/8″ thick shell and heads, 200 # w.p. @ 150° F.
1—3′x4′x3/8″ thick shell and heads, 125 # w.p. @ 150° F. stress relieved.
1—5′x16′x13/16″ thick shell and heads, 250 # w.p. @ 200° F.
1—5′6″x50′x7/8″ thick shell and heads, 20 tray BB rerun column, 250 # w.p. @ 300° F. stress relieved and radiographed.
3—6′10″x21′6″x7/8″ thick shell and heads, Stratco contactors wi inner shell 5′3⅝″x15′7″x1/2″ thick shell and heads and G-R tube bundle 1½″ steel pipe and 3.37″ OD G. fins, shells stress relieved.
1—12′x66′x3/4″ thick shell and heads, 29 tray stripper column, 100 # w.p. @ 200° F. stress relieved and radiographed, mounted on 9′4″ skirt.
2—12′6″x85′5″x1″ thick shell x 5/8″ thick heads, 40 tray extractor columns, 150 # w.p. @ 300° F. radiographed only, mounted on 16′7″ skirt.
2—12′x22′x15/16″ thick shell and heads, 150 # w.p. @ 200° F. radiographed.
1—3′x7′x1/4″ thick shell and heads, 50 # w.p. @ 300° F.
2—6′x38′x3/8″ thick shell and heads, 250 # w.p. @ 300° F. stress relieved and radiographed.
1—7′x60′x9/16″ thick shell and heads, 25 tray concentrator, 150 # w.p. @ 450° F. mounted on 5′11″ skirt.
1—3′x5′x5/16″ thick shell and heads, 50 # w.p. @ 350° F.
1—7′x30′x9/16″ thick shell and heads, 150 # w.p. @ 200° F. stress relieved and radiographed.
1—3′6″x16′x5/16″ thick shell and heads, 50 # w.p. @ 200° F.
1—4′6″x16′x3/8″ thick shell and heads, 110 # w.p. @ 150° F.
1—8′x20′x3/8″ thick shell and heads, 50 # w.p. @ 180° F.
1—6′x4′10″x7/16″ thick shell and heads.
1—6′x13′x5/16″ thick shell and bottom, open top.
2—36″x8′, 275 # w.p. air receivers, National Board stamped, mounted on 14″ skirt.
1—3′x6′x3/8″ thick shell and heads, 125 # w.p. @ 150° F. stress relieved, mounted on 2′9″ dia x 6″ high skirt.
4—3′x12′3″x3/8″ thick shell x 7/16″ thick heads, 180 # w.p. @ 650° F. stress relieved and radiographed.
1—10′x25′x11/16″ thick shell and heads, 100 P.S.I. vacuum 15″ @ 250° F. stress relieved and radiographed.
1—6′x8′x1/4″ thick shell and heads.
1—4′6″x10′x1/4″ thick shell and heads, 50 # w.p. @ 150° F.
1—3′6″x30′x1/2″ thick shell and heads, 10 tray regeneration column, 175 # w.p. @ 450° F. stress relieved and radiographed, mounted on 4′9″ skirt.
1—3′6″x30′x1″ thick shell and heads, 6 side pans, regeneration column, 250 # w.p. @ 450° F. stress relieved and radiographed, mounted on a 4′9″ skirt.
1—12′x33′x1-1/16″ thick shell and heads, 155 # w.p. @ 200° F. stress relieved and radiographed.
1—4′x16′x9/16″ thick shell and heads, 175 # w.p. @ 150° F. stress relieved.
1—3′6″x6′x3/8″ thick shell and heads.
1—11′x45′x1/4″ thick shell and heads, 180 # w.p., stress relieved and radiographed.
2—8″x3′ scrubber, 50 # w.p.
1—24″x5′x1/4″ thick shell and heads, 50 # w.p.
1—3′6″x5′x1/4″ thick shell and heads, 35 # w.p.
1—3′6″x15′x5/16″ thick shell and heads, 100 # w.p. @ 200° F.
1—15½″x58″x1/2″ thick shell x ½″ flgd. head x ½″ conical bottom.
1—4′x26′x5/16″ thick shell and heads, 35 # w.p. @ 150° F. mounted on 8′ skirt.
1—7′x40′x3/8″ thick shell and heads, 50 # w.p. @ 150° F.
2—2′6″x15′x3/8″ thick shell and heads, 150 # w.p. @ 450° F.
1—3′x25′x3/8″ thick shell and heads, 175 # w.p. @ 200° F. mounted on 3′ skirt.
1—4′x16′x1/2″ thick shell and heads, 175 # w.p. @ 200° F.
1—4′6″x16′x1/2″ thick shell and heads, 150 # w.p. @ 200° F.
1—4′6″x50′x3/8″ thick shell and heads, 20 tray rerun column, 50 # w.p. @ 450° F. mounted on 10′ skirt.
1—6′x15′x5/16″ thick shell and heads.

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COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

24,000 feet
New 4″ OD Seamless
BOILER TUBES
20-22 ft. Random lengths
Plain ends, beveled for welding
Ideal for gas lines

Reconditioned
SEAMLESS TUBING
21,000 ft. 5½″ O.D.
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95,000 ft. 1½″ O. D.
Single or Double Random Lengths
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TOWERS

4—4'6" ID x 56'8" x 58' Overall Shell ½"; Heads 1¼"; Flanged and Dished ASTM-A-70 Fire Box Plate; Design Pressure 300# at 650° F.; Test Pressure 580#; Stress Relieved and Radiographed; Weight 36,000#; API-ASME Code by Chicago Bridge & Iron Works—Trays to be fabricated to your specifications. Above towers in service only 15 months.

VICTORY SUPPLY COMPANY
120 N. Elgin, Tulsa, Oklahoma
Phone 54-5073

FOR SALE

5—10³⁄₈" Butler Slip Type Casing Elevators w/ 1 Set Slips **$150.00 ea.**
1—Set 5½", 6⅝", 7", 8⅝", 9⅝" or 10¾" Slips for above Elevator **$50.00 set**
1—20" Regular Casing Spider w/ 1—Set 20" Slips **$200.00**
3—13⅝" Cameron S D A Blow Out Preventers w/ 4½" Rams **$750.00 ea.**
1—13⅝" Cameron S D A Blow-out Preventer w/ Blank Rams **$750.00 ea.**

Above prices quoted FOB Shreveport, La.

Phone 3-0671 — P.O. Box 1242
Shreveport, La.

EQUIPMENT WANTED

FAILING model 44, Failing 55, Sullivan 200, or other drill similar capacity, Drill rod N, PK. Box D-277, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL BUY for Spot Cash any quantity used oil field equipment, Tanks, Rigs, Engines, Rods, Wire Lines, Belts and Tubular Goods. Give full description, location, and price for what you have to sell by letter.

A. R. KELLY
Oil Field Service & Supplies
Parkersburg, West Virginia

WANTED

Complete Rotary Rig suitable for drilling up to 10,000'; state location, make, price, condition, etc.

A. C. R. COMPANY
19615 Nottingham Road
Cleveland 10, Ohio

HELP WANTED

PIPELINE operator for Mid West gathering system 3500 b-d. Must be experienced and aggressive. Box D-290, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES REPRESENTATIVE

Fully qualified person to sell tar saturated asbestos pipe line felt on national basis but with headquarters in Southwest.

Should have knowledge of market and application with good acquaintance in the pipe line industry.

Good salary plus expenses, additional compensation later tied in with accomplishment. Reply giving details to:

GAMA INDUSTRIES, INC.
70 Pine Street
New York 5, N. Y.

HELP WANTED

AGENTS WANTED: Armstrong Internal Condenser Tube Cutters. Owing to our recent expansion program, we have a few openings for reliable agents. Apply listing lines now handled and territory covered. Armstrong & Sons, Ridgefield, N. J.

GAS ENGINEER. Opening for gas engineer with at least five years general experience in natural gas business. Work in distribution and utilization phases of business particularly important. Age, under 35. Location, Northwest, and position will involve some travel. Box D-289, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW foreign and domestic Oil Employment Directory. Over 500 listings in drilling, production, refining, natural gasoline pipe lines, geological, exploration, supplies manufacturers, services; and trucking, refinery and pipe line contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla (Our 28th year).

WANTED: Experienced gas gathering system and gas measurement man, immediate employment, for gasoline plant location in central Texas. Write giving experience, age, family, present employer, and salary expected. All replies strictly confidential and all of our employes have been notified of this advertisement. Box D-286, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ROTARY DRILLING Superintendent now employed desires to change to West Texas or Mid-Continent area. Family of four, sober, dependable, investigation invited, references. Box D-273, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Pn. No. 131, Hobbs, New Mexico.

MICROPALEONTOLOGIST: 3 years experience, B.A. degree, and one year of graduate study, available January 1. Box D-279, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION ENGINEER: Sixteen years' experience in corrosion and secondary recovery. Prefer to locate in Mid-Continent or Texas area. Box D-292, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION Superintendent, graduate petroleum engineer, 36, experienced all phases drilling, completion, production. Desire responsible connection with active organization. Excellent references. Box D-295, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Mechanical Engineer, 31, experienced in gasoline plant construction, at present employed by Major Oil Co. which is completing its construction program, wants work in mechanical equipment design or application. West Coast location preferable. Box D-294, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

WANTED

WANTED

Proven royalty leases on oil producing land. Will buy some small and large parcels.

A. C. R. COMPANY
19615 Nottingham Road
Cleveland 10, Ohio

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

LEASE AND DRILLING BLOCKS

SEE A. L. BOWLES, ADA, OKLA., FOR DRILLING DEALS, LEASES, ROYALTIES

INTERESTED in a small to medium water flooding proposition in Kansas or Oklahoma. Box D-285, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND for oil lease, 2,000 acres. Part Agua Dulce tract. Five miles north Harlingen, Texas. Oil producing around this area. Write Edward Gee, 2600 West 79th, Chicago, Illinois.

WANTED TO BUY: Settled Oil Production located in Illinois, Indiana, or Western Kentucky. Do not offer property unless it will stand rigid inspection. We are independent producers and will treat offerings with confidence. Box D-265, The Oil and Gas Journal, Tulsa, Oklahoma.

LOCATED JUST RIGHT in the Great San Juan Basin of New Mexico . . . 11,000 acres, ten year leases, 25c per acre rentals, all one lease. $2.50 per acre, small oil payment. Opportunity of a lifetime, no delay, no stalling, act quick if you want it. Box D-280, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and Gas Lease W½ Sec. 4 T 19 N. R68W, located in Laramie County, Wyoming, being 329.97 acres approximately. C. A. Jensen, 704-15th Ave., N.W., Ardmore, Oklahoma.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
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Bought direct for you on your purchase order. My lease block map and reprint of press and magazine articles clearly outlining this play mailed on request.

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Wire, Write or Call

JOHN ALLEN
Suite 200, Grand Pacific Hotel
Bismarck, North Dakota

(Member National Oil Scouts and Landmen Association. References exchanged.)

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

FOR SALE

MERCURY
Pure grade, .0000% non volatile residues. Each lot tested for purity before packaging. Packed in 1, 5 & 10 lb. glass containers. For prices & terms address H M Co., P. O. Box 6012, Dept. O, Kansas City, Mo.

FOR SALE

Oil Refinery—manufacturing—road oils, asphalts, fuel oils, diesel fuel, naphthas, etc., well located on Signal Hill, Long Beach, California, connects with three pipe lines. Good distribution. Money maker. Priced right.

Box D-296, The Oil and Gas Journal, Tulsa, Oklahoma

ADVERTISERS IN THIS ISSUE

Abegg & Reinhold Co. 108
Aerofin Corporation 128
Allis-Chalmers Mfg. Co. 16
Allen's Foundry & Machine Works 126
American Forge & Manufacturing Co. 97
American Manufacturing Co. of Texas 4
American Optical Company 23
Armco Drainage & Metal Products, Inc. 49
Baker Oil Tools, Inc. 118, 123
Barret, Inc., William M. 120
Barrett Div., Allied Chemical & Dye Corp. 103
Bethlehem Steel Co. 13
Bonney Forge & Tool Works 99
Boyd Company, The Clarence L. 96
Briggs Bituminous Composition Co. 96
Charlie's Machine Works 120
Chicago & Southern Air Lines 119
Chicago Bridge & Iron Company Inside Back Cover
Christopher & Son Iron Works, Geo. C. 124
Clark Bros. Co., Inc. 72
Classified Advertising 137, 138, 139
Coleman Instrument & Manufacturing Company 120
Coody Bender Co., The 102
Crose Manufacturing Co., Inc., M. J. 97
Cutler-Hammer, Inc. 94
Dean Brothers Pumps, Inc. 97
Delta Engineering Sales Co. 104
Dowell Incorporated 32
Dragon Mfg. Co. 120
Dresser Industries, Inc. 20, 72
Drilling & Service, Inc. 89
Drilling Specialties Company 112
du Pont 81, 82, 83, 84
Electric Machinery Mfg. Company 22
Fairbanks, Morse & Co. 2
Franks Mfg. Corp. Front Cover
General American Transportation Corporation 86, 87
General Electric Company 62, 63
Geophoto Services 125
Grancell, I. H. 107
Homestead Valve Manufacturing Co. 19
Huey & Company, S. E. 102
Hughes Tool Co. Back Cover
Jones & Laughlin Supply Co. 6, 7
Kaiser Steel Corporation 134
Kelley Company, Ben F. 119
Kidde & Company, Inc., Walter 21
Koch Engineering Co., Inc., The 55
Koehring Company 24, 25
Koppers Company, Inc. 101
Lane-Wells Company 106
Larkin Packer Company, Inc. 8
Link-Belt Company 5
L-K Pump Valve Co. 108
Martin-Decker Corp. 10
McCord Corporation 128
McDonald Co., B. F. 105
Metals Disintegrating Company, Inc. 77
Mexia Tubing Rotator Company 3
Mission Mfg. Co. 111
Mountain Iron & Supply Co. 27
Murphy Diesel Company 9
National Airoil Burner Co., The 105
National Bank of Tulsa 121
National Carbon Co., Inc. 92
National Supply Co., The 50, 51
Nordstrom Valve Division, Rockwell Manufacturing Co. 14, 15
Oil Base, Inc. 18
Oil Center Tool Co. 17
Oklahoma Contracting Co., Inc. 98
Paris Distributor, Inc., Henry H. 122
Parkersburg Rig & Reel Co. 116
Parkhill Truck Company, Inc. 95
Parsons Company, Subsidiary of Koehring Company 25
Peerless Pump Division of Food Machinery & Chemical Corporation 102
Penberthy Injector Co. 107
Perrault Brothers 95
Petroleum Electric Power Association 109
Pittsburgh Pipe Cleaner Co. 100
Porter Company, Inc., H. K. 30
Powers Regulator Company, The 124
Raybestos-Manhattan, Inc., Packing Div. 26
Rector Well Equipment Co., Inc. 108
Republic Steel Corporation 127
Ross-Martin Co. 108
Standco Brake Lining Co. 108
Timken Roller Bearing Company 12
Tobin Aerial Surveys, Edgar 114
Tretolite Company 86
Union Carbide & Carbon Corp. 92
United Supply & Manufacturing Co. 11
Up-Right Scaffolds 28
Victaulic Co. of America 29
Wales Trucking Co. 102
Wallace & Tiernan Products, Inc. 128
Walworth Co. 1
Welex Jet Services, Inc. 34
Williamson, Inc., T. D. 98
Wright Chemical Corporation 122
Wyatt Metal & Boiler Works Inside Front Cover

CALENDAR OF EVENTS

December

American Institute of Chemical Engineers, annual meeting, William Penn Hotel Pittsburgh, Pa., December 4-7.

Interstate Oil Compact Commission, annual meeting, Roosevelt Hotel, New Orleans, December 5-7.

Annual joint meeting of Texas sections of American Institute of Mining and Metallurgical Engineers, Texas A. & M. College, College Station, Tex., December 8-9.

American Chemical Society, southwest regional meeting, Oklahoma City, December 8-10.

National Society of Professional Engineers, annual meeting, Houston, December 8-10.

Natural Gasoline Association of America, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex., December 9.

January

Kansas Independent Oil and Gas Association, annual meeting, Wichita, January 16.

February

American Institute of Chemical Engineers, regional meeting, Houston, February 26-March 1.

American Society for Testing Materials, spring meeting, Hotel William Penn, Pittsburgh, February 27-March 3.

Southern Gas Association, meter and regulator conference, Houston, February 9-10.

March

American Petroleum Institute, Division of Production, Southwestern District meeting, Adolphus Hotel, Dallas, March 8-10.

Indiana Independent Petroleum Association, spring convention, Hotel Severin, Indianapolis, March 9-10.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, March 27-29.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Skirvin Hotel, Oklahoma City, March 29-31.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas Nomads, first Monday of each month, Texas Room, Baker Hotel.

Houston Nomads, second Monday of each month. Ye Olde College Inn Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, annual Christmas party, Biltmore Hotel, December 3.

Aluminum Pipe Line Approved by FPC

WASHINGTON.—The Federal Power Commission last week authorized the construction of an experimental aluminum-alloy pipe line to see whether that metal can be so treated as to provide a satisfactory substitute for steel.

A 9,500-ft. section of lateral line will be built of aluminum-alloy by Alabama-Tennesse Natural Gas Co. at the request of the Reynolds Alloy Co., to serve the Reynolds plant at Listerhill, Ala. The line will cost $6,300 more than if built of steel pipe, and the FPC permitted the use of aluminum on the ground that while it is not in general use for the transmission of natural gas its use is feasible for the purposes desired by the company.

The experiment was authorized as one of a number of modifications in a previously authorized project which will increase its cost by some $1,300,000 to a total of $4,081,500.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given tha the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands under sec. 17 of the Leasing Act of February 25, 1920 (41 Stat. 437; 30 U.S.C. sec. 181), as amended. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D. C., on or before 1 p.m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (a) (2) and (a) (3), Circular 1730. The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the number of the parcel and the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of at least double the amount of rental, but in no case less than $1,000 nor more than $5,000, must be furnished by a successful bidder prior to the issuance of a lease. An acceptable $5,000 surety bond will be required prior to commencing drilling operations on the land. The deposits of the other bidders will be returned upon acceptance of the successful bids. Bidders are warned against violation of section 1860, Title 18, U. S. Code, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent to 25 per cent for oil, and 12½ per cent to 16⅔ per cent for gas, in accordance with Schedule B in the lease form. Annual rental will be at the rate of $1.00 per acre. The lands are in the known geologic structure of the Wilson Creek field, 6th P.M., Colorado, and are offered in the following parcels: T. 2 N., R. 94 W., Parcel No. 1, sec. 10, N½NE¼, SE¼NE¼, 120 acres. Parcel No. 2, sec. 11, NW¼, N½SW¼, SE¼, 400 acres. T. 3 N., R. 94 W., Parcel No. 3, sec. 13, SW¼, 160 acres. Parcel No. 4, sec. 13, S½SE¼, 80 acres. Parcel No. 5, sec. 24, NE¼, 160 acres. Parcel No. 6, sec. 24 W½SE¼, sec. 25, NW¼NE¼, 120 acres. Total 1040 acres. Bids must be submitted on or before 1 p.m. December 14, 1949, and must be submitted on each parcel separately, but no objection will be made to the award of more than one parcel to the same successful bidder. Marion Clawson, Director.

TABLE OF CONTENTS ON PAGE 33

the Horton* HEMISPHEROID

BEST FOR—storing moderately volatile liquids that require pressures of 2½ or 5 lbs. per sq. in. to stop standing storage losses under normal operating conditions. It is used primarily for the storage of natural gasoline, motor fuel, and aviation gasoline.

ADVANTAGES—prevents or reduces all types of evaporation losses—combines evaporation protection of pressure storage with low erection cost of cylindrical shell—efficiency independent of liquid level in the tank, works as well nearly full or almost empty—reduces fire hazard during the storage period—dependable and trouble-free in operation—cuts down corrosion.

SIZES—Plain Hemispheroids are available in capacities from 2,000 to 20,000 bbls. for a pressure of 2½ lbs. per sq. in. and from 2,000 to 7,500 bbls. for 5 lbs. pressure. Noded Hemispheroids are available in capacities from 10,000 to 30,000 bbls. for a pressure of 2½ lbs. per sq. in.

Above: 10,000-bbl. Plain Hemispheroid used for storing aviation gasoline at the Antofagasta, Chile marketing terminal of the Esso Standard Oil Company (Chile) S.A.C.

Right: 20,000-bbl. Noded Hemispheroid used for storing natural gasoline for the Carthage Corporation at Carthage, Texas.

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CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1836 North 50th St.
Boston, 10.....1625—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2804 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 14.....1523 General Petroleum Bldg.
New York, 6.....3147—165 Broadway Bldg.
Philadelphia, 3.....1618—1700 Walnut Street Bldg.
Salt Lake City, 1..1525 First Security Bank Bldg.
San Francisco, 11..1254—22 Battery Street Bldg.
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